IPP
VOLUME I

SALT WASH PROPOSAL

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

U. S. DEPARTMENT OF THE INTERIOR
March 3, 1849

DRAFT ENVIRONMENTAL STATEMENT
INTERMOUNTAIN POWER PROJECT
US Department of the Interior
Bureau of Land Management

INTERMOUNTAIN POWER PROJECT

DRAFT ENVIRONMENTAL STATEMENT

VOLUME I SALT WASH PROPOSED SITE

Prepared By:
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Paul L Howard

Paul L. Howard, Utah State Director

SUMMARY

(X) Draft ( ) Final Environment Statement

Department of the Interior
Bureau of Land Management
Utah State Office

1. TYPE OF ACTION (X) Administrative ( ) Legislative.

2. BRIEF DESCRIPTION OF ACTION

The Intermountain Power Project is proposed by a group of Utah, California, Nevada, and Wyoming municipalities, rural electric cooperative, and a privately-owned company. The applicant has proposed construction and operation of a 3,000-megawatt coal-fired generating station at the Salt Wash site, Wayne County, Utah and has agreed to the possibility of an alternative site, near Lynndyl in Millard County, Utah. Both sites are analyzed in comparable detail.

Two 500-kilovolt d.c. transmission lines are proposed to deliver power to a converter station at Victorville, California. Power would then be distributed over existing systems to the cities of Anaheim, Burbank, Glendale, Los Angeles, Pasadena, and Riverside. One 230-kilovolt a.c. transmission line is proposed to deliver power to the Ely, Nevada area and a 230-kilovolt transmission line is proposed to provide power to the Dixie-Escalante area in Utah. In addition, two 345-kilovolt lines are proposed to be inter-connected with existing systems in Utah for delivery to members of the Intermountain Consumer Power Association and the Utah Power and Light Company.

About 8 million tons of coal would be acquired annually from the Wasatch Plateau-Book Cliffs Coal Fields of Central Utah to be consumed at the power plant. Approximately 50,000 acre-feet of water would be consumed annually.

3. SUMMARY OF ENVIRONMENTAL IMPACTS AND ADVERSE ENVIRONMENTAL EFFECTS

The generating station and support facilities, including power transmission systems, would occupy 2,650 to 5,650 acres of land and would disturb 8,300 to 12,000 acres during construction phases.

Applications for rights-of-way on public lands include 39,500 acres for the Salt Wash proposal, and 25,600 acres for the Lynndyl alternative. Ownership of an additional 4,640 acres of public land for the power plant site would be transfered to the project.

Air quality studies predicted that ground level concentrations of sulfur-dioxide and particulates at the Salt Wash site would exceed the Class I air quality standards identified in the Prevention of Significant Deterioration Regulations. This violation of standards would occur within Capitol Reef National Park. Similar air quality studies at the Lynndyl alternative site indicated that neither state or federal air quality standards would be exceeded.

The use of 30,000 acre-feet of water from Fremont River for the Salt Wash Site would decrease the river's downstream flow by about 57 percent and would increase the salinity of the Colorado River at Lees Ferry an estimated 0.6 milligrams per liter. The conversion of water from agricultural use to consumptive use at the Lynndyl alternative site could require the retirement of 7,200 to 7,800 acres of irrigated farmland. The Lynndyl alternative site would cause a 9 percent reduction of water flowing to areas surrounding the Delta, Utah area which could affect wildlife habitat. Even with present salvage techniques, some scientific and educational archaeological information could inadvertently be lost.

Conflicts among specific features of IPP's project proposals and the existing land use plans of U.S. Forest Service and Bureau of Land Management would require consideration.

The project, during construction phases, would create direct employment for 3,200 to 3,600 persons. During operational periods, about 660 persons would be employed by IPP.

The increases in population, housing, and economic activity in the impact areas, whether it be in Wayne or Millard and Juab counties, would create socioeconomic impacts. Present local governmental operations, procedures and community infrastructures would be placed under stress, especially during the peak of IPP construction.

4. ALTERNATIVES CONSIDERED

Alternatives considered included power plant sites in Emery, Grand, Wayne, and Millard counties, Utah; transmission line routes and design; water sources; alternative coal handling facilities; coal transportation; generating station design; alternative methods of land transfer for the plant site; purchase of other power; conservation of electrical energy; and no action.

5. COMMENTS WILL BE REQUESTED FROM THE FOLLOWING:

Attached is a list of federal, state, and non-government agencies and organizations with jurisdiction and expertise which will receive copies of the draft statement.

6. DATE DRAFT MADE AVAILABLE TO THE ENVIRONMENTAL PROTECTION AGENCY AND THE PUBLIC:

ATTACHMENT

FEDERAL AGENCIES

Advisory Council on Historic Preservation
Department of Agriculture
- Forest Service
- Soil Conservation Service

Department of Commerce
- National Oceanic and Atmospheric Administration

Department of Defense
Department of Energy
- Bonneville Power Administration
- Office of Energy Research
- Office of Environment

Western Area Power Administration
Department of Health, Education and Welfare
Department of Housing and Urban Development
Department of the Interior
- Bureau of Indian Affairs
- Bureau of Mines
- Bureau of Reclamation
- Fish and Wildlife Service
- Geological Survey
- Heritage Conservation and Recreation Service
- National Park Service
- Office of Surface Mining

Department of Labor
- Mine Health and Safety Administration
- Occupational Safety and Health Administration

Department of Transportation
- Federal Aviation Administration
- Federal Highway Administration

Environmental Protection Agency
Interstate Commerce Commission

STATE AGENCIES AND ENTITIES

State of Utah
- Utah State Agencies Clearing House (A-95)

State of Arizona
- Governor's Clearing House

State of Nevada
- Governor's Clearing House

State of California
- Governor's Clearing House

LOCAL AGENCIES

County Commissioners:
- Carbon, Castle Dale, Emery, Garfield, Iron, Juab, Millard, Piute, Sanpete, Sevier, Utah, Wayne (Utah); Lincoln, White Pine, Clark

(Nevada); Mojave (Arizona); San Bernardino (California).
Five-County Association of Governments (Utah)
Six-County Commissioners Organization (Utah)
Southeastern Utah Assocation of Governments

NONGOVERNMENTAL ORGANIZATION

Archaeological Society of Utah
Canyon Country Coalition
Chamber of Commerce (Carbon County)
Chamber of Commerce (Salt Lake Area)
Common Cause
Conservancy Resource Center
Council of Utah Resources
Defenders of the Outdoor Heritage
Defenders of Wildlife
Desert Protective Council
Enchanted Wilderness Association
Environmental Awareness
Environmental Defense Fund, Rocky Mountain/Great Plains
Escalante Wilderness Committee
Friends of the Earth
Good Earth
Institute of Ecology
Izaak Walton League - Utah Division
ISSUE
League of Women Voters
Mearns Wildlife Society
Mineralogical Society of Utah
National Parks and Recreation Association
Natural Resources Defense Council Inc.
National Wildlife Federation
Nature Conservancy
Pro-Utah, Inc.
Rocky Mountain Center on Environment
Rocky Mountain Federation of Mineralogical Societies
Rocky Mountain Sportsmen Association
Save Our Canyons Committee
Sierra Club
Society of Conservation of Bighorn Sheep
Utah Audubon Society
Utah Cattlemen's Association
Utah CLEAR
Utah Environment Center
Utah Farm Bureau
Utah Geological and Mineral Survey
Utah Lung Association
Utah Mining Association
Utah Nature Study Society
Utah Sportsmen Association
Utah Water Users Association
Utah Wildlife and Outdoor Recreation Federation

Utah Wool Growers Association
Wasatch Mountain Club
Western Rockhound Association
The Wilderness Society
Women's Conservation Council of Utah

PRIVATE COMPANIES AND UNIVERSITIES

Irrigation Companies (Millard County, Utah)
Proponents of the Intermountain Power Project
Coal companies in the Carbon County-Emery County area.
Brigham Young University
University of Utah
College of Eastern Utah
Southern Utah State College
Dixie College
University of Nevada, Las Vegas

PREFACE

On November 18, 1974, the Utah State Director of the Bureau of Land Management was authorized to prepare, for the Intermountain Power Project (IPP) proposal, a site specific environmental statement which would comply with the National Environmental Policy Act of 1969 (NEPA), Public Law 91-100. NEPA requires a full disclosure of all actions within the project which would have significant impacts upon the human environment. IPP, the applicant, provided all data and information which describes the proposed project within this environmental statement. Data and information obtained from sources other than IPP's documents are cited within the text.

This document is also being used by the California municipal utilities as an Environmental Impact Report (EIR) pursuant to the California Environmental Quality Act (CEQA). The information in this document printed in italics was furnished by the Department of Water and Power of the City of Los Angeles, which is acting as lead agency for the purpose of CEQA.

The U.S. Geological Survey (USGS) has prepared an environmental statement Development of Coal Resources in Central Utah which discusses environmental issues related to coal sources, mining activities, miners, cummulative impacts, and interrelationships with other projects and proposals. This statement analyses the environmental impacts from the point at which coal would leave the mine tipple enroute to the generating complex.

IPP has conducted detailed feasibility studies for two possible plant sites. Volume I of this statement discusses the proposed Salt Wash site and Volume II discusses the alternative Lynndyl site.

Issues and impacts which would have negligible or no effect upon the environment have been analyzed by the interdisciplinary team and are not discussed in this statement.

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CHAPTER 1

DESCRIPTION OF THE PROPOSAL

CHAPTER 1
DESCRIPTION OF THE PROPOSED ACTION

A. INTRODUCTION

The Intermountain Power Project (IPP) proposes to build a 3,000 MW electrical generating facility near Hanksville, Utah. Figure 1-1 shows the location of the proposed facility and the proposed routes of a Southern California Transmission System and a Utah Transmission System.

B. HISTORY AND BACKGROUND

The Intermountain Consumers Power Association (ICPA), with headquarters in Sandy, Utah, was organized to provide support for hydroelectric power development through the Colorado River Storage Project. Membership consisted of 30 utilities or cooperatives in Utah, eastern Nevada, and southern Wyoming.

Through ICPA efforts, Colorado River storage power was purchased and distributed to association customers. In 1970, however, The Department of the Interior, Bureau of Reclamation, notified ICPA that additional Colorado River Storage power would not be available for load growth beyond 1976 and ICPA elected to investigate purchasing power from other utilities and participating in proposed power development projects. When these possibilities failed to materialize, ICPA began exploring the feasibility of generating its own electricity.

In 1973, representatives of ICPA and several California utilities agreed to study development of a large coal-fired generating plant in Utah. The outcome was the Intermountain Power Project which was formed with the filing of non-profit corporation documents dated January 18, 1974.

Amendments to Utah's Interlocal Cooperation Act were passed by the Utah State Legislature in 1977. The Intermountain Power Agency was formed in accordance with the revised act. The Intermountain Power Agency would own IPP, and energy output would be sold to each participant in accordance with individual power sales contracts. The Interlocal Cooperation Act Ammendments require the output of a project such as IPP to be offered to all utilities serving customers within Utah. The resulting participation in the proposal, as of September 28, 1978, is shown on Table 1-1.

One of the participants in IPP, the Los Angeles Department of Water and Power, was responsible for the preliminary engineering and feasibility study. Site selection criteria included the availability of water and coal, aesthetics, and other environmental and economic considerations. Possible plant sites were identified by IPP for study--several in central Wayne County, Utah and one about 20 miles southeast of Escalante in Garfield County, Utah.

BLM issued permits to the proponent to drill exploratory wells so that they might determine if significant quantities of ground water were available in central Wayne County within the Navajo Sandstone Formation. The ICPA filed several applications with the Utah Division of Water Rights to appropriate both surface and ground water. A contract for surface water from the Fremont River was agreed upon by ICPA and the Wayne County Water Conservancy District on August 14, 1976. A public hearing was held April 5, 1977 on ICPA's ground water applications. Approval is pending the Utah State Engineer's decision.

The IPP Board of Directors has adopted a resolution to pursue coal development in the Central Utah region, primarily in the southern portions of the Wasatch Plateau and the Emery coal field.

PROPOSED
INTERMOUNTAIN POWER PROJECT

FIGURE 1-1

TABLE 1-1

Participation in the Intermountain Power Project

Utility	Participation (Percent)	Power Allocation (MW)
Beaver	0.333	9.99
Bountiful	1.375	41.25
Bridger Valley (Wyoming)	0.230	6.90
Dixie-Escalante	1.000	30.00
Enterprise	0.133	3.99
Ephraim	0.330	9.90
Fairview	0.120	3.60
Fillmore	0.333	9.99
Flowell	0.200	6.00
Garkane	1.267	38.01
Herber	0.507	15.21
Holden	0.040	1.20
Hurricane	0.147	4.41
Hyrum	0.447	13.41
Kanosh	0.040	1.20
Kaysville	0.483	14.49
Lehi	0.430	12.90
Logan	2.000	60.00
Meadow	0.037	1.11
Monroe	0.130	3.90
Moon Lake	2.000	60.00
Morgan	0.190	5.70
Mt. Pleasant	0.233	6.99
Mt. Wheeler (Nevada)	1.167	35.01
Murray	3.334	100.02
Oak City	0.040	1.20
Parowan	0.237	7.11
Spring City	0.040	1.20
Price City	0.234	7.02
Utah Power and Light (interstate)	25.000	750.00
Total in Utah	42.057	1,261.71 MW
Los Angeles	34.084	1,022.52
Anaheim	10.225	306.75
Burbank	1.704	51.12
Glendale	1.704	51.12
Pasadena	3.409	102.27
Riverside	6.817	204.51
Total in California	57.943	1,738.29 MW

Representatives of the Intermountain Power Project made firm project proposals by filing right-of-way applications and other documents with the BLM Utah State Director on November 4, 1976. Applications requested use of public lands for the power generating complex, transmission routes, sites for water storage, reservoirs, water well fields, pipelines, route for coal haul railroad, microwave communication stations, and a new town site. These applications were supplemented with IPP's Engineering and Feasibility Study Reports--four volumes dated October, 1976 and a fifth volume dated May, 1977. In April of 1977, IPP applied for the use of public land administered by the Bureau of Land Management for the New Town town site.

C. PURPOSE AND NEED FOR PROJECT

The primary purpose in constructing IPP would be to provide electrical energy to meet the projected load growth for ICPA, Utah Power and Light, and participating California municipalities. As lead agency for fulfilling the requirements of the California Environmental Quality Act, the Los Angelel Department of Water and Power has prepared a detailed discussion of purpose and need. Their submission appears in Appendix I-1.

Figure 1-2 compares participant projected peak demand and their generating capabilities with and without IPP. The need for IPP's generating capacity is based on forecasts which each participant has prepared for their own system, using their own techniques and judgment suitable to their operation and circumstances. ICPA and UP&L have indicated to the Utah Public Utility Commission the need for additional generating capacity in order to meet their projected load growth. The California Energy Commission has independently developed its own comparable load forecasts for the California municipalities. With the exception of UP&L, the total forecasted growth for the participants' combined system annual peak demand from 1985 to 1995 is 5,029 MW, representing a combined compound growth rate of about 4.2 percent.

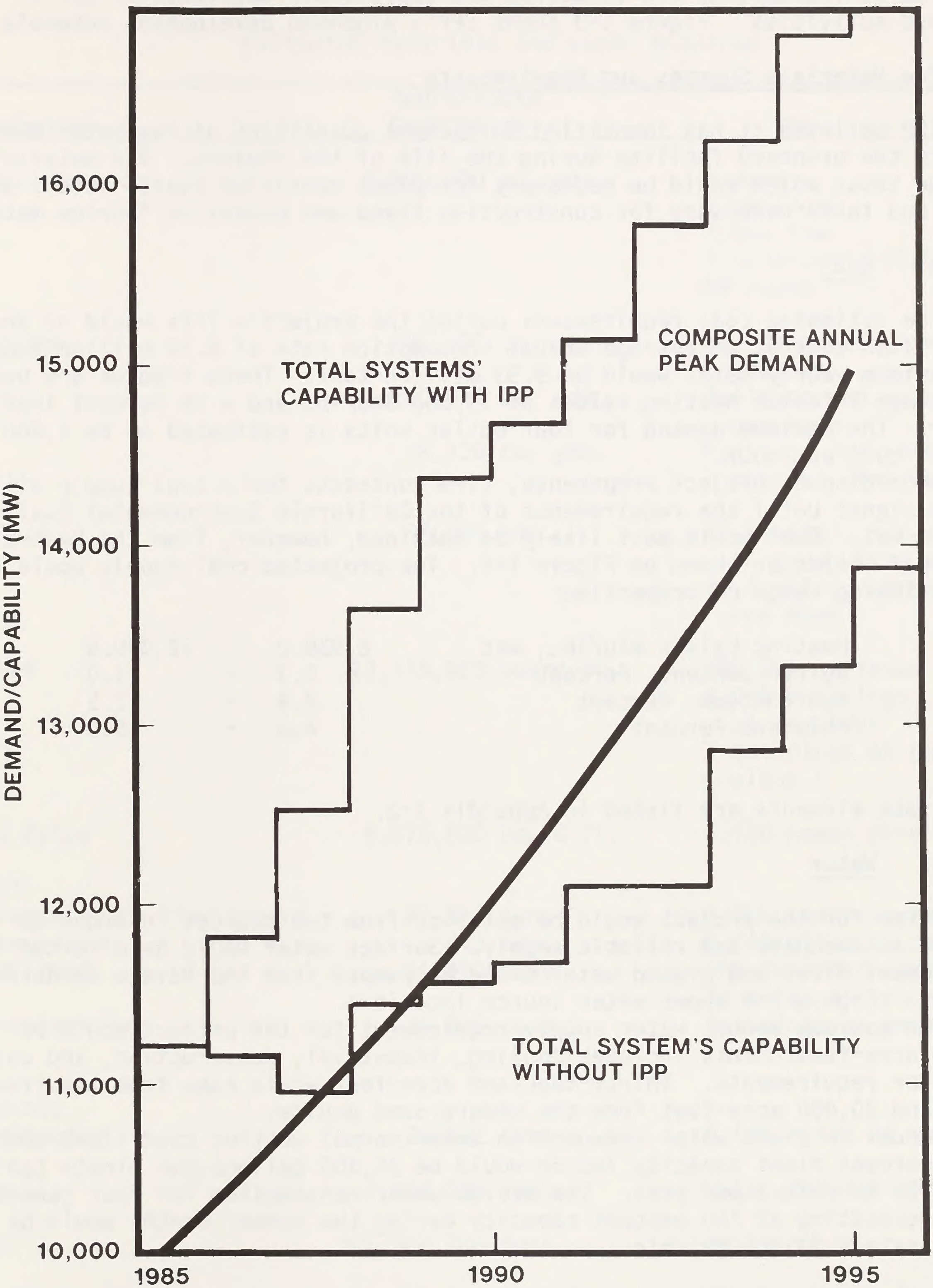
D. APPLICANT'S PROPOSAL

The IPP generating station would consist of four 750 MW steam-electric generating units, each powered by a pulverized coal-fired boiler. Commercial operation of the first generating unit would begin July, 1986. The remaining three units would begin operating at one year intervals. Estimated project life is 35 years.

The generating station would require approximately 8.12 million tons of coal annually and in excess of 300 million tons of coal during its projected life. Coal would come from Central Utah coal fields, such as the Wasatch Plateau and the Emery coal fields, and would be transported to the site by a proposed railroad.

A maximum total of about 50,000 acre-feet of water would be required annually for plant operation, community needs, and reservoir losses. The major consumptive water use would be in dissipation of waste heat from the generating station. Water would come from two sources: the Fremont River and the Navajo Sandstone formation, an aquifer. Visual A, located in a pocket on the rear cover, is a map of the proposed primary project components and contains the location of all major project components.

Plant construction, operation, and supportive coal mines would introduce a large new population into the region. The peak number of construction workers would be approximately 2,600. Plant and coal transportation system operation would require 610 employees.



DEMAND AND GENERATING CAPABILITY

FIGURE 1-2

Tables 1-2 through 1-4 summarize the approximate magnitude of IPP's proposed activities. Figure 1-3 shows IPP's proposed development schedule.

1. Raw Materials Sources and Requirements

IPP believes it has identified sufficient quantities of raw materials to operate the proposed facility during the life of the project. Raw materials include those which would be necessary for plant operation (coal, water, and lime) and those necessary for construction (sand and gravel or "borrow material").

a. Coal

The estimated coal requirements during the project's life would be about 308 million tons at an average annual consumption rate of 8.12 million tons. The maximum yearly total would be 9.93 million tons. These figures are based on average lifetime heating values of 11,560 Btu/lb. and a 75 percent load factor. The maximum demand for four boiler units is estimated to be 1,600 tons of coal per hour.

According to project proponents, firm contracts for a coal supply will not be signed until the requirements of the California Environmental Quality Act are met. Coal would most likely be obtained, however, from the Central Utah Coal Fields as shown on Figure 1-4. The projected coal supply would have the following range of properties:

Heating Values Btu/lb., wet	8,930.0	-	12,970.0
Sulfur content, Percent	0.3	-	1.0
Ash content, Percent	4.4	-	12.5
Moisture Percent	4.0	-	15.0

Trace elements are listed in Appendix I-2.

b. Water

Water for the project would be obtained from two sources in order to provide an adequate and reliable supply. Surface water would be diverted from the Fremont River and ground water would be pumped from the Navajo Sandstone aquifer. Figure 1-5 shows water source locations.

The maximum annual water supply requirement for the project would be 50,000 acre-feet. This includes cooling, industrial, construction, and culinary water requirements. Thirty-thousand acre-feet would come from the Fremont River and 20,000 acre-feet from the underground aquifer.

Annual in-plant water consumption under normal weather conditions and at an 85 percent plant capacity factor would be 24,300 gallons per minute (gal/min) or 39,200 acre-feet per year. The design water consumption for four generating units generating at 100 percent capacity during the summer months would be approximately 33,000 gal/min.

c. Lime

A high calcium, pebble lime would be used for removing SO_2 from the flue gases and for raw water softening.

TABLE 1-2

Estimated Materials and Lands Required

Material	Approximate Quantities	Use
Borrow Material	7,600,000 cu. yds.	2 dams 1 railroad 1 new town 1 generating station 58 roads
Concrete	180,000 cu. yds.	Buildings at generating station
	200,000 cu. yds.	Building and walks at new town
	98,120 cu. yds.	Footings for transmission line towers
Asphalt	57,000 yds.	17.4 miles, access roads to generating plant 41.1 miles, streets at new town
Lumber	23,115,000 board ft.	355,000 railroad ties 1,020 buildings at new town 7 buildings at generating plant
Wood Poles	9,876,000 board ft.	6,750 power poles
Steel		
Transmission line towers	37,510 tons	7,355 steel towers
Conductor	5,040 tons	6,140 miles of conductor
Railroad	56,000 tons	180 railroad cars 70 miles of track
Construction	28,000 tons	Buildings at generating station
Aluminum		
Conductor	26,022 tons	6,140 miles of conductor
Lime	3,640,000 tons	Water and Air treatment
Coal	308,580,000 tons	Heat source
Water	50,000 acre feet annually	Plant and new town supply
Pipe	100 miles	Generating plant, water supply system, and new town

TABLE 1-2 (concluded)

Material	Approximate Quantities	Use
Mobile Homes	1,300 units	New town temporary and permanent housing
Electricity used in Operation	280 MW	For operation of plant
Total land occupied	5,650 acres	Occupied acreage for project life
Permanently occupied land	4,610 acres	Irreversibly occupied
Gasoline and Diesel	1,900,000 gal. gasoline 86,590,000 gal diesel	For commuting to work Operation of railroad

TABLE 1-3

Approximate Acreage Requirements of IPP Facilities[a]

Facility	Total Acreage Disturbed	Acres Occupied for Life of Project	Acres Temporarily Disturbed	Acres R/W Applied For By IPP
Acreage Requirements Within Right-of-Way Applications				
Plant Site	2,170	2,170	0	4,640
Red Desert Reservoir Site	1,190	1,180	10	3,840
Diversion Works--Fremont River	40	40	0	100
Well Field	470	470	0	1,080[b]
Coal Haul Railroad	470	190	280	770
New Town Factory Bench	1,080	1,080	0	1,080
Borrow Areas	200	0	200	3,410
Southern California Transmission System	4,720	240	4,480	23,331
Utah Transmission System	870	95	775	5,907
Microwave Communication	10	10	0	10
Highway and Road Access[c]	90	90	0	90
Sub-Total	11,310	5,565	5,745	44,168
Acreage Requirements Outside of Right-of-way Applications				
Southern California Transmission System				
Access to Power Transmission Corridors	140	60	80	--
Project Offices[d]	15	0	15	--
Field Offices and Storage Yards[e]	240	0	240	--
Concrete Batch Plant[f]	60	0	60	--

TABLE 1-3 (concluded)

Facility	Total Acreage Disturbed	Acres Occupied for Life of Project	Acres Temporarily Disturbed	Acres R/W Applied For By IPP
Utah Transmission System				
Access to Transmission Corridors	90	25	65	--
Field Offices and Storage Yards[e]	35	0	35	--
Sub-Total	580	85	495	--
Total	11,890	5,650	6,240	44,168

[a]Figures rounded to nearest 10 acres.

[b]Includes well sites and 100 foot right-of-way for pipeline, powerline, and road access to each well. IPP has applied for 57,600 acres for the well field.

[c]Access occupies the same area as other right-of-way requests with the exception of 68 acres for secondary access to new town and 25 acres for access to microwave sites.

[d]Three offices of 5 acres each.

[e]Requires 7 acres every 25 miles.

[f]Requires 1 acre every 15 miles along the Southern California System only.

TABLE 1-4

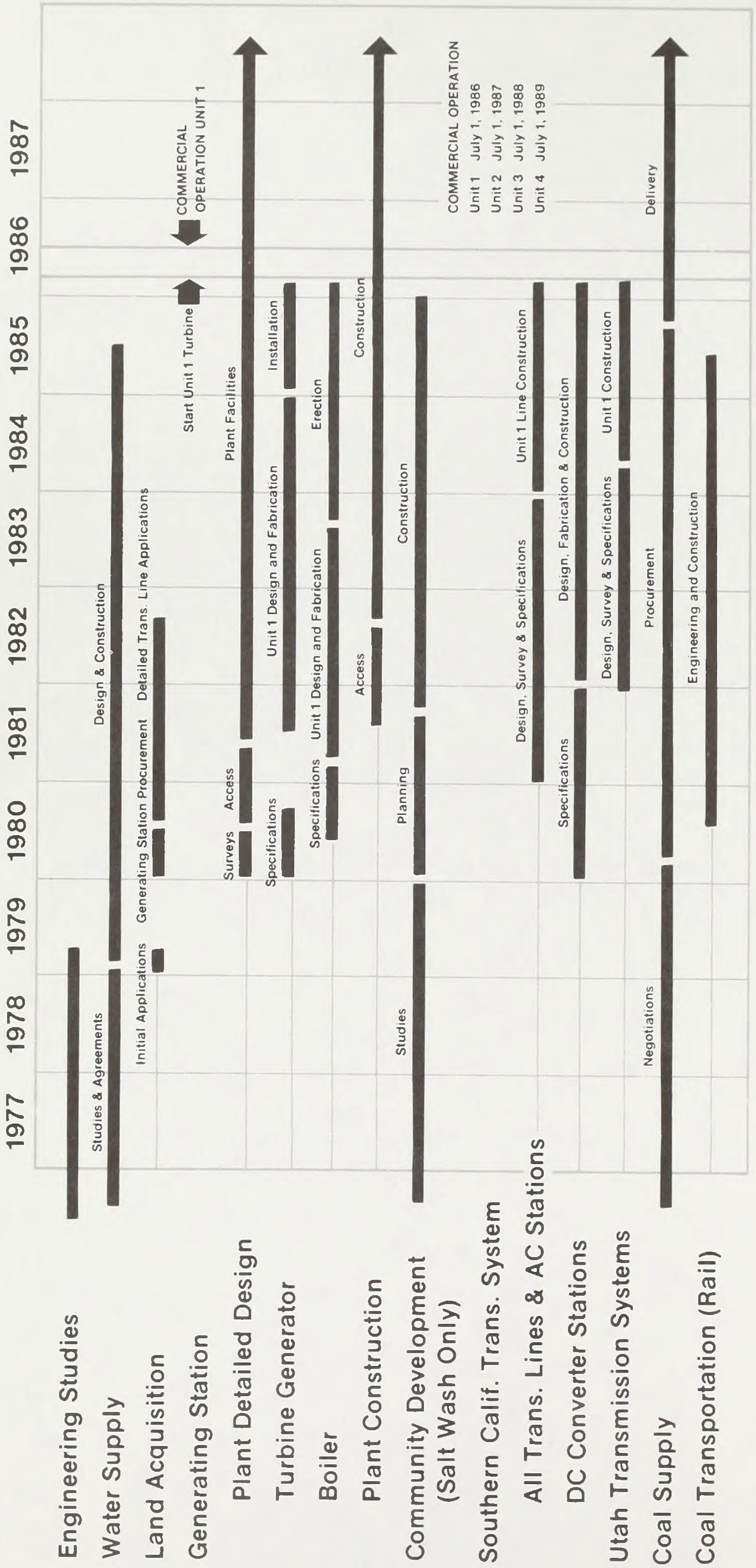
Rights-of-Way[a] Required for Proposed New Road and Highway Access[a]

Land Ownership Status	Permanent Access		Temporary Access		Total	
	Miles	Acres	Miles	Acres	Miles	Acres
BLM	[b]133	1,332	526	5,102	659	6,434
USFS	7.5	68	22	214	29.5	282
State of Utah Land	[b]15.5	156	57	553	72.5	709
Private Land	9	87	115	1,115	124	1,202
Bureau of Reclamation			3	29	3	29
Total	165	1,643	723	7,013	888	8,656

Note: 650 miles (1,098 acres) of existing access would be used.

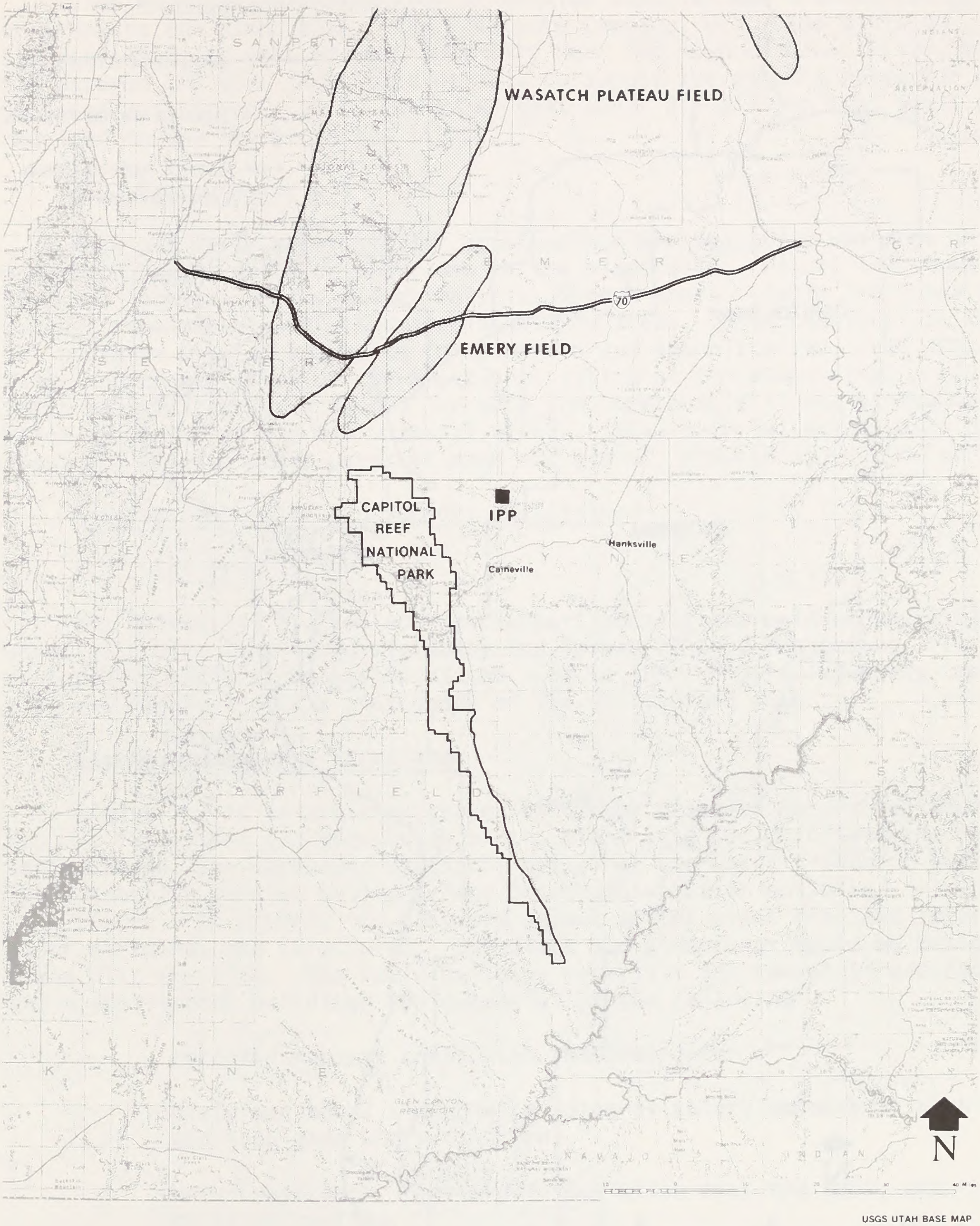
[a]Access roads occupy the same area as other right-of-way requests with the exception of 68 acres for the secondary road to new town and 25 acres for access to microwave sites.

[b]Fifty-eight miles would be paved on BLM and 1.5 miles would be paved on Utah State lands for new town and plant site.



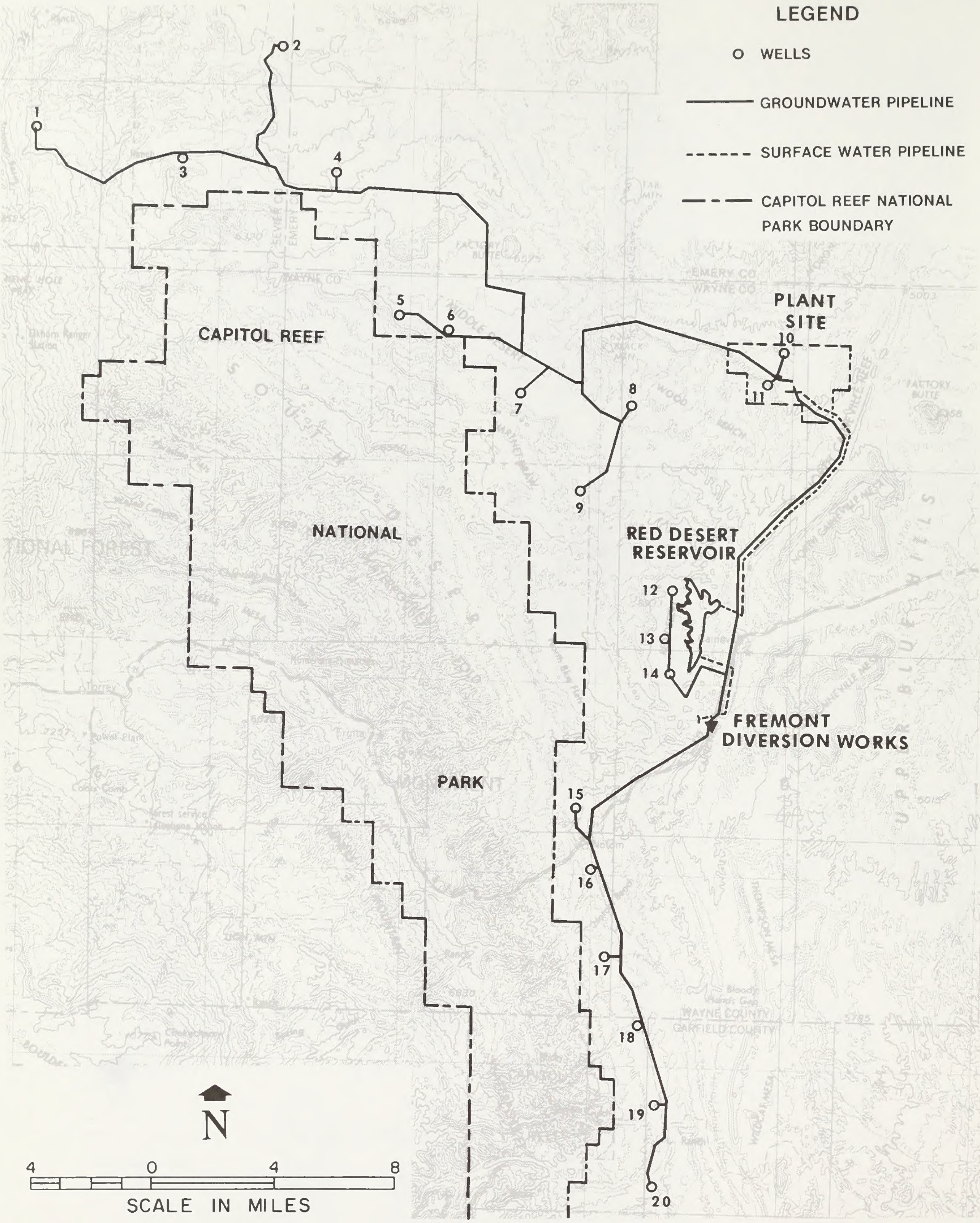
PROPOSED DEVELOPMENT SCHEDULE

FIGURE 1-3



COAL SOURCES

FIGURE 1-4



WATER SOURCES

FIGURE 1-5

Lime would be purchased from an outside supplier and transported by rail or truck to the plant site. The Flintkote Company, U.S. Lime Division (located 45 miles west of Salt Lake City near the town of Grantsville, Utah) has assured IPP that they would be able to supply the plant's needs for their proposed facilities. It is estimated that about 3.6 million tons would be required during the project's life.

d. Borrow Materials

Rock and earth materials for construction and operation would be developed from borrow areas on and close to the plant site. Figure 1-6 shows the proposed location of the eleven material borrow areas. Table 1-5 summarizes acreage requirements for the material borrow areas. Rock construction material would be used as aggregate for concrete and asphalt mixes, road subbase, dams, and construction of the impervious lining of the evaporation ponds. Earth material would be needed for both the impermeable lining of the evaporation ponds and at the ash disposal areas. Total material needs would be about 7.6 million cubic yards of sand and gravel, crushed aggregate, and sand.

2. Generating Station and Support Facilities

a. Site Description

The generating station and its support facilities would occupy 4,640 acres of public land administered by the Bureau of Land Management. It is proposed to transfer ownership of the site to IPP. Figure 1-7 shows the site plan and Figure 1-8 is a photograph of the undisturbed site.

b. Buildings and Structures

Figure 1-9 is an artist's rendering of the proposed generating facility. Support facilities and structures at the plant site would include the railroad engine house, the warehouse and shops building, the water treatment building, the automotive service building, and the administration building.

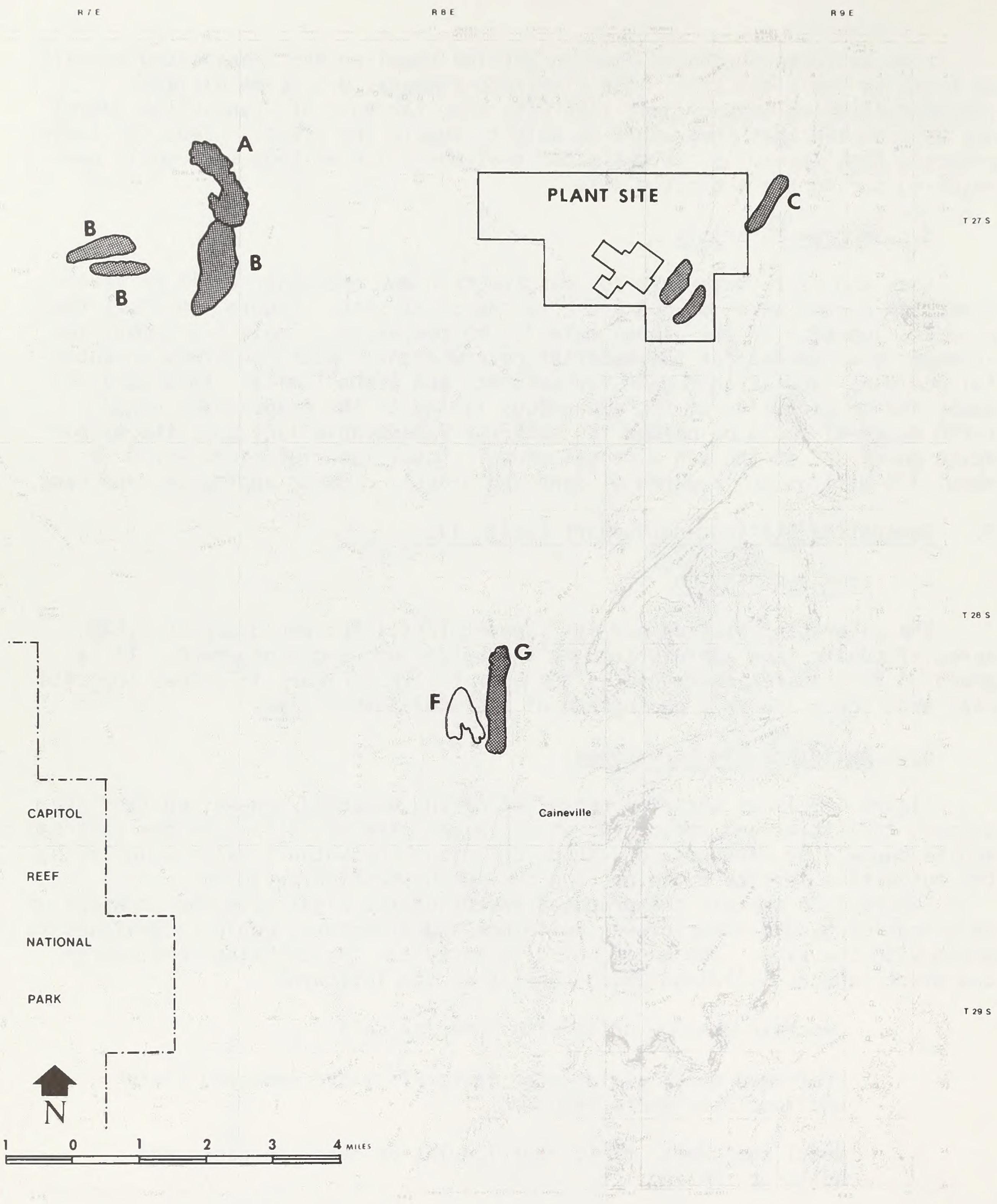
Figure 1-10 depicts the proposed layout of the plant site and location of major buildings and structures. Buildings and structures would be designed to blend with the site. The basic building materials for the plant enclosures and miscellaneous buildings would consist of the following:

concrete masonry units with integral color.

preformed metal siding with integral color, embossed finish and insulated where required.

metal roof deck, rigid roof insulation over the deck, and built-up roofing.

Concrete masonry would generally be used on the lower structures and enclosures, while the metal siding would be used for high structures, screens, and miscellaneous buildings on the site. All structures, foundations, and structural components of the buildings would be designed in accordance with accepted engineering practices.



BORROW AREAS

FIGURE 1-6

TABLE 1-5

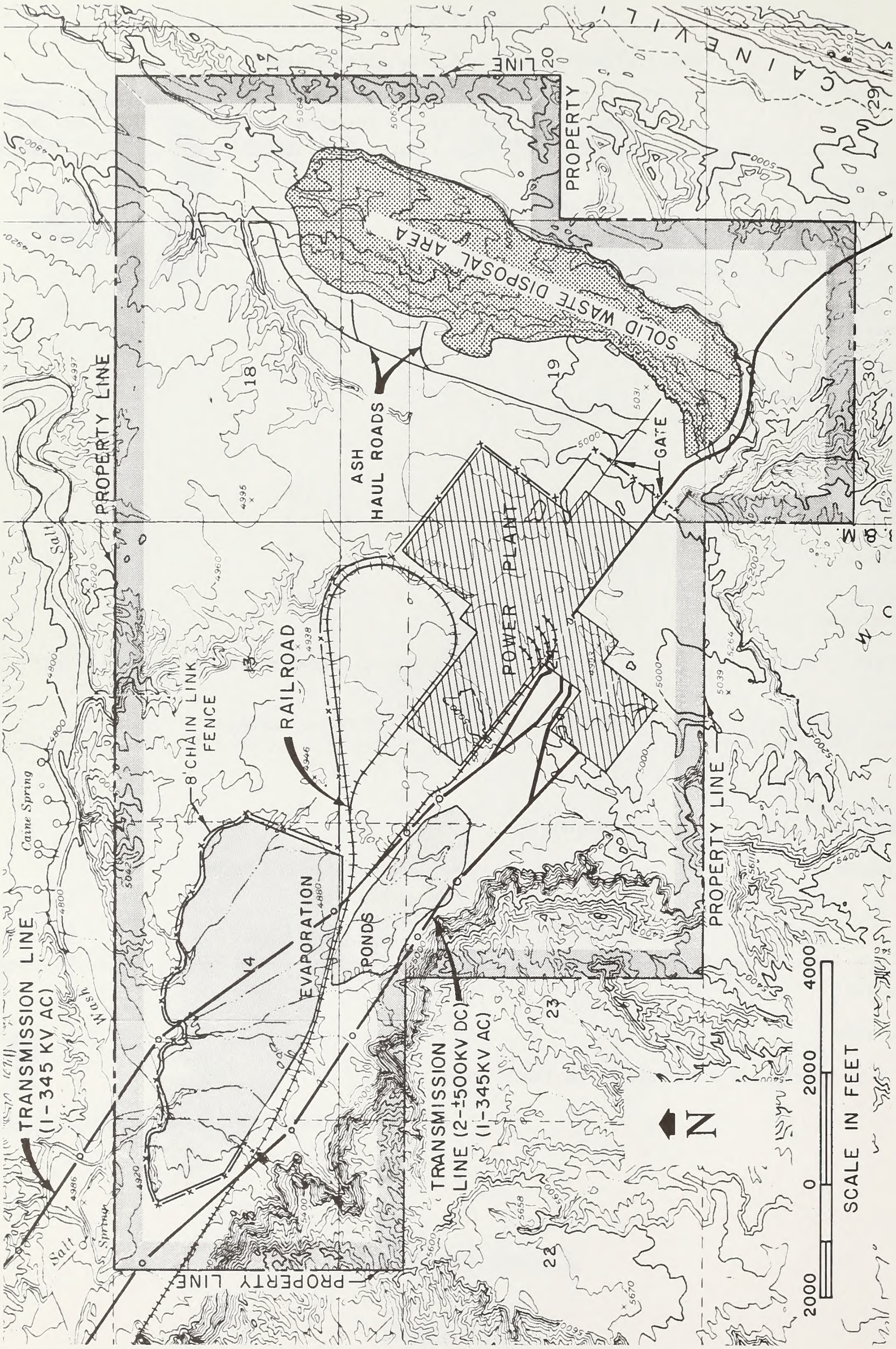
Material Borrow Areas--Approximate Acreages

Site	Quantity of Material (cubic yards)	Potential Borrow Area (acres)	Acres to be Used for Borrow Material
A - Black Mountain[a]		470	
Road aggragate	340,000		13
Railroad ballast	c		15
New Town aggragate	400,000		
Generating station aggragate	650,000		
B - (Three Areas)[a]		593	53
Pea gravel	510,000		
C - Caineville Reef[a]		140	32
Evaporation ponds			
Mancos Shale	650,000		
D - Land fill cover, soil[a]	1,320,000		
E - Ivie Creek Bench[b]	c	620	15
Railroad sand and gravel			
Emery Moore	c	450	15
Mesa Butte	c	470	15
Railroad sand stone			
F - Red Desert Zone 1[a]		320	30
dam core	620,000		
Red Desert Zone 2 obtained from reservoir site	1,680,000	To be flooded	
Red Desert Zone 3		160	15
Morrison for filter	40,000		
G - Diversion Site	59,620	Same areas as for Red Desert Dam.	
Total	7,589,620	3,414	203

[a]See Figure 1-6

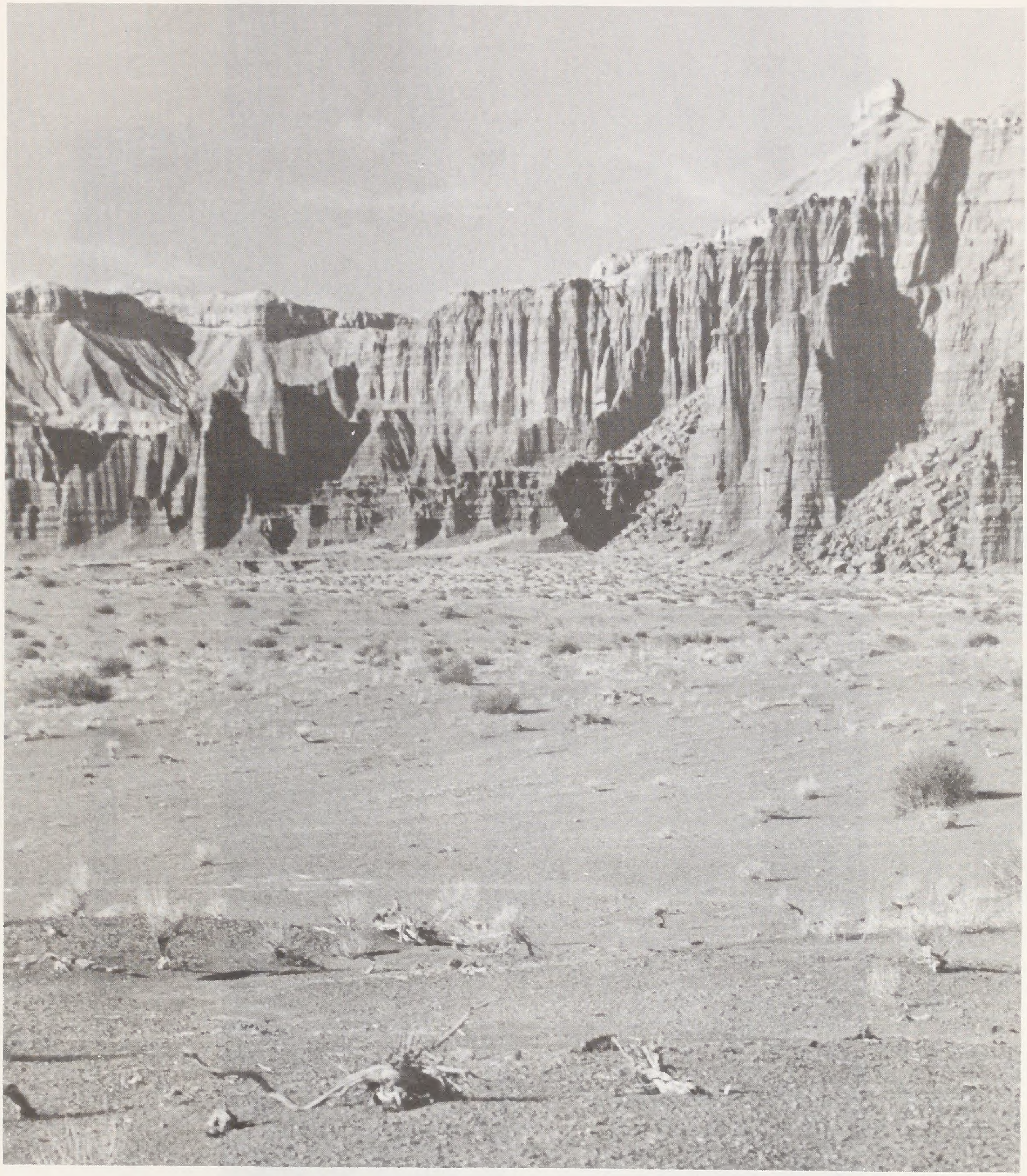
[b]See Figure 1-18

[c]1,320,000 cubic yards would be taken from these areas.



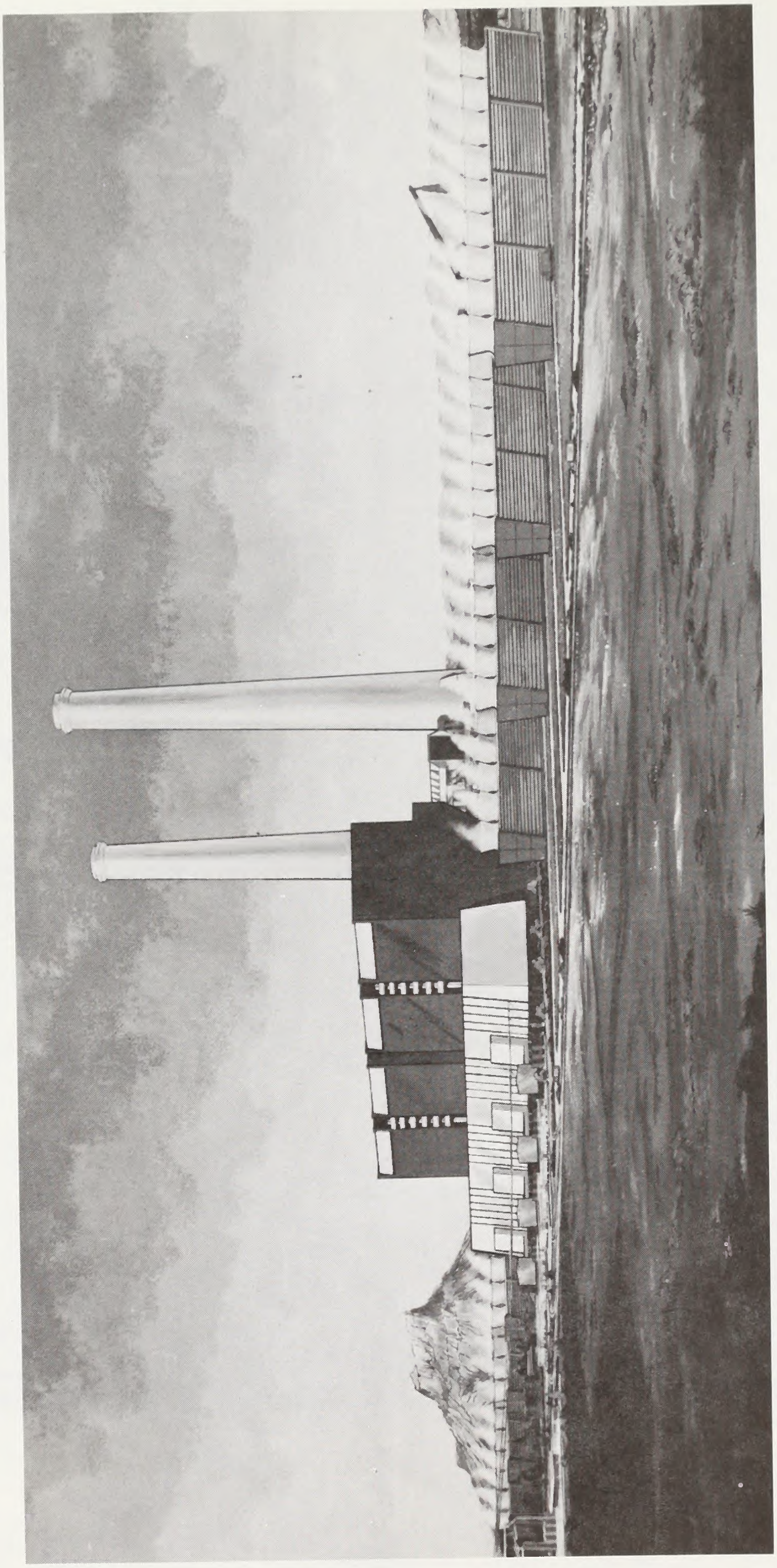
GENERAL SITE PLAN

FIGURE 1-7



PLANT SITE

FIGURE 1-8



PROPOSED GENERATING FACILITY

FIGURE 1-9

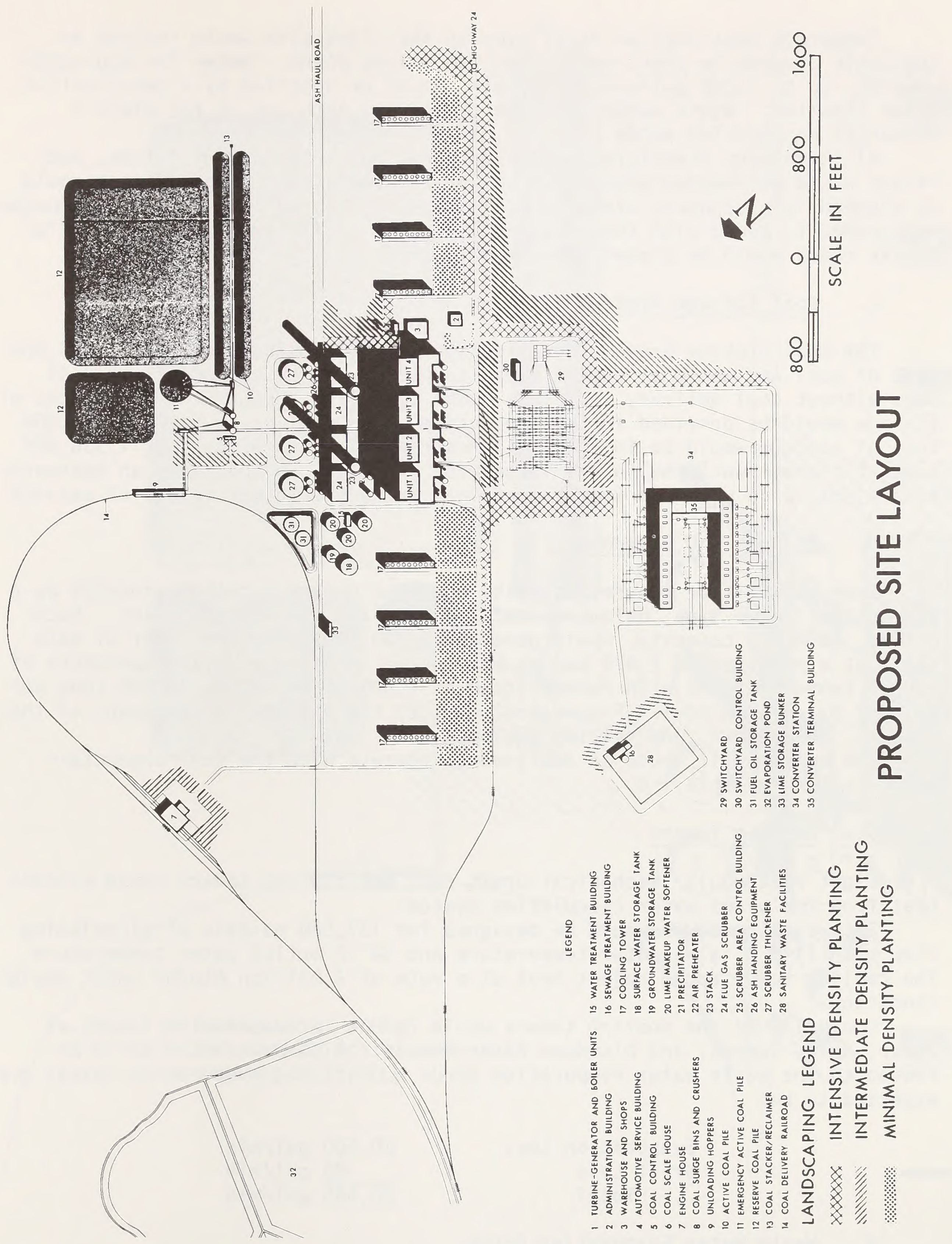

PROPOSED SITE LAYOUT
ASH HAUL ROAD
TO HIGHWAY 24
UNIT 1
UNIT 2
UNIT 3
UNIT 4
SCALE IN FEET
800 0 800 1600
LEGEND
1 TURBINE-GENERATOR AND BOILER UNITS
2 ADMINISTRATION BUILDING
3 WAREHOUSE AND SHOPS
4 AUTOMOTIVE SERVICE BUILDING
5 COAL CONTROL BUILDING
6 COAL SCALE HOUSE
7 ENGINE HOUSE
8 COAL SURGE BINS AND CRUSHERS
9 UNLOADING HOPPERS
10 ACTIVE COAL PILE
11 EMERGENCY ACTIVE COAL PILE
12 RESERVE COAL PILE
13 COAL STACKER/RECLAIMER
14 COAL DELIVERY RAILROAD
15 WATER TREATMENT BUILDING
16 SEWAGE TREATMENT BUILDING
17 COOLING TOWER
18 SURFACE WATER STORAGE TANK
19 GROUNDWATER STORAGE TANK
20 LIME MAKEUP WATER SOFTENER
21 PRECIPITATOR
22 AIR PREHEATER
23 STACK
24 FLUE GAS SCRUBBER
25 SCRUBBER AREA CONTROL BUILDING
26 ASH HANDING EQUIPMENT
27 SCRUBBER THICKENER
28 SANITARY WASTE FACILITIES
29 SWITCHYARD
30 SWITCHYARD CONTROL BUILDING
31 FUEL OIL STORAGE TANK
32 EVAPORATION POND
33 LIME STORAGE BUNKER
34 CONVERTER STATION
35 CONVERTER TERMINAL BUILDING
LANDSCAPING LEGEND
INTENSIVE DENSITY PLANTING
INTERMEDIATE DENSITY PLANTING
MINIMAL DENSITY PLANTING

FIGURE 1-10

Temporary construction facilities at the plant site would include an aggregate processing plant and a concrete mixing plant. Water for aggregate washing, up to 1,200 gallons per minute, would be supplied by a construction water pipeline. Waste water would be discharged into one of the plant's permanent evaporation ponds.

All temporary structures, temporary fencing, temporary utilities, and refuse would be removed when construction is completed. Cleared areas would be blended into adjacent undisturbed landscape. Borrow areas would be smoothed and graded to blend with the adjacent landscape. All temporary construction access roads would be closed and rehabilitated.

c. Coal Storage Areas

The coal storage areas, shown in Figure 1-11, would hold about 1,860,000 tons of coal and would allow the plant to operate at rated capacity for 48 days without coal delivery. Of this total capacity, 3 days or 120,000 tons of storage would be provided in the two active storage piles, 5 days or 190,000 tons of storage would be in the small reserve pile, and 40 days or 1,550,000 tons of storage would be in the large reserve pile. In addition, an emergency active coal pile would be formed when the stacker-reclaimer is out of service.

d. Boilers and Generators

Each of the four generating units would be driven by steam produced by a conventional drum type, balanced draft, pulverized coal-fired boiler. Each boiler, at rated capacity, would generate 5,700,000 pounds per hour of main steam at a pressure of 2,475 pounds per square inch and with a temperature of 1,005° Fahrenheit (F) with reheat steam at 1,005° F when burning 388 tons per hour of pulverized coal. Figure 1-12 depicts the physical arrangement of the boilers, generators, and related equipment.

The boiler unit would be designed to operate with the coal characteristics shown in Table 1-6.

e. Cooling Towers

Eight rectangular mechanical draft duct wet cooling towers would extract heat from the plant water circulation system.

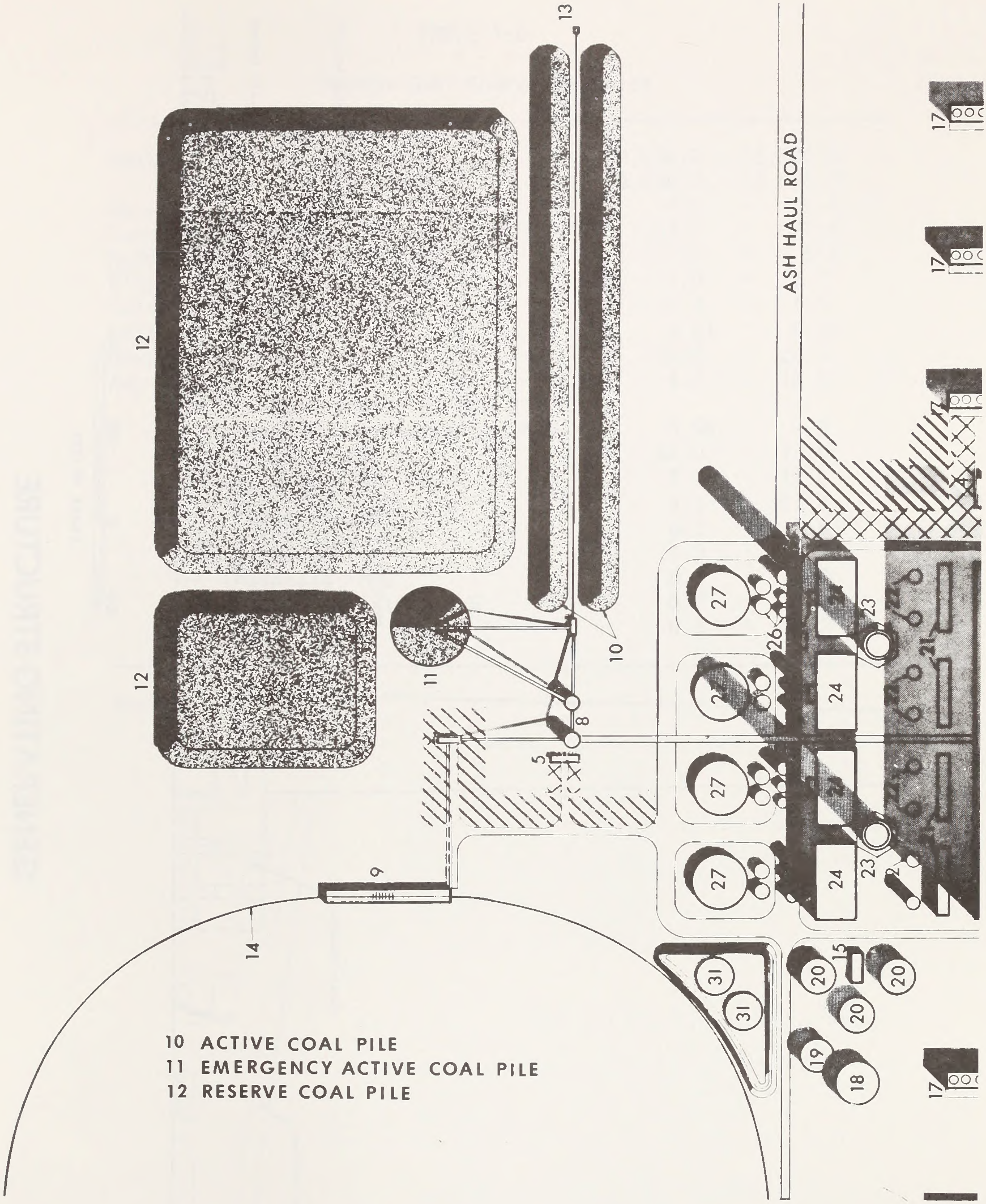
Each cooling tower would be designed for 133,500 gal/min of circulating flow with 114° F inlet water temperature and 84° F outlet water temperature. The cooling tower would reject heat at a rate of 4 billion Btu/hr under design conditions.

Operation of the cooling towers would result in evaporative losses of water, drift losses, and blowdown water losses. Blow down water would be routed to the waste water evaporation ponds. Drift and evaporation losses are expected to be:

Evaporation Loss	20,600 gal/min
Drift Loss	85 gal/min
Total	20,685 gal/min

f. Waste Water Evaporation Ponds

Evaporation ponds would be used to dispose of plant waste water that contains an excessive concentration of dissolved solids. Plant waste water would result from the four sources shown on Table 1-7.



COAL STORAGE

FIGURE 1-11

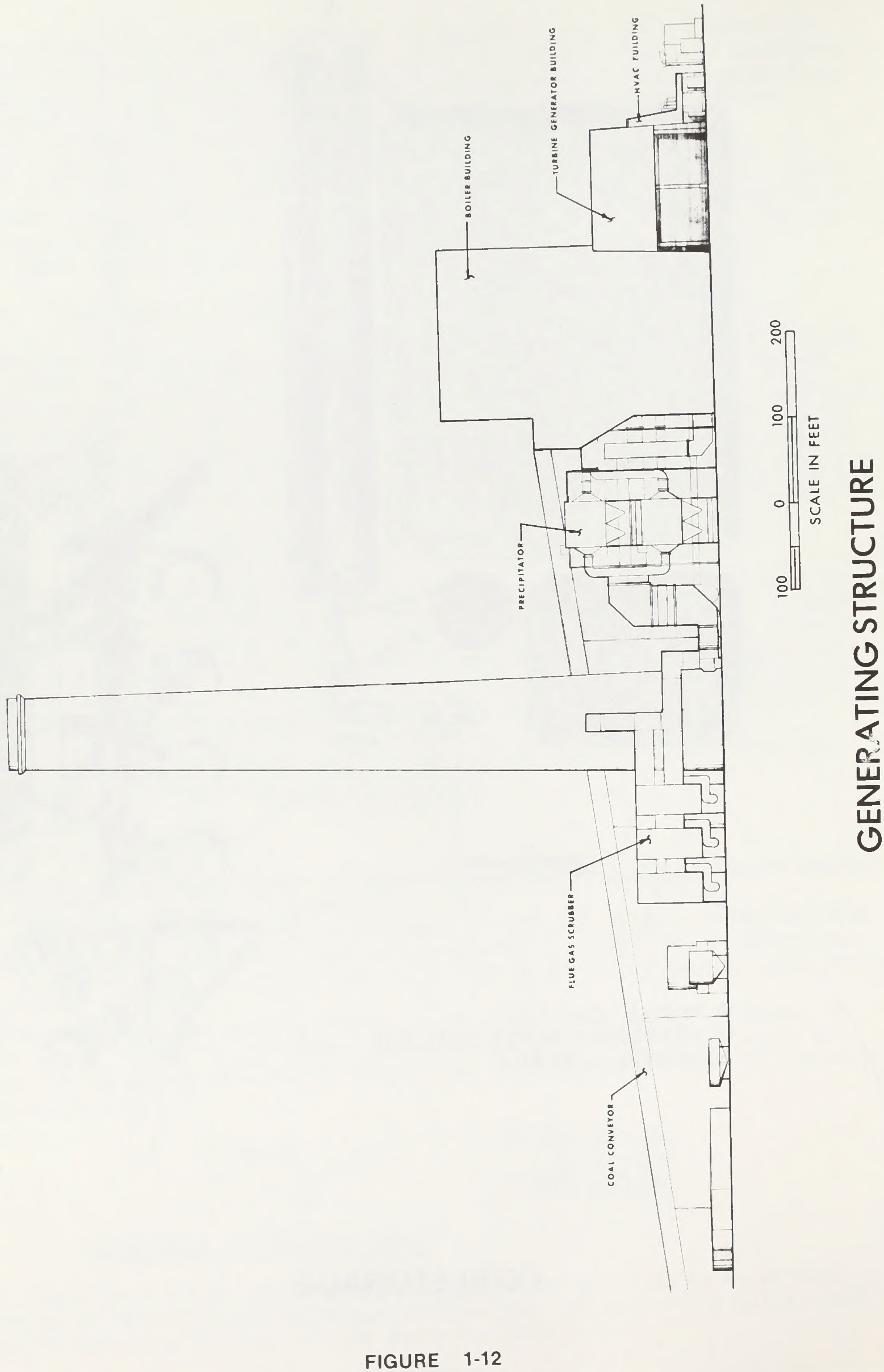

BOILER BUILDING
TURBINE GENERATOR BUILDING
HVAC FUILDING
PRECIPITATOR
FLUE GAS SCRUBBER
COAL CONVEYOR
100
0
100
200
SCALE IN FEET
GENERATING STRUCTURE

FIGURE 1-12

TABLE 1-6

Design Coal Characteristics

Heating Value Btu/lb., Dry	10,600.0 - 13,500.0
Btu/lb., Wet	8,930.0 - 12,970.0
Moisture, Percent	4.0 - 15.0
Carbon, Percent	53.0 - 73.0
Hydrogen, Percent	3.6 - 5.0
Nitrogen, Percent	1.0 - 1.2
Sulfur, Percent	0.3 - 1.0
Chloride, Percent	0.01 - 0.03
Oxygen, Percent	10.0 - 20.0
Ash Percent	4.4 - 12.5
Percent Composition of Ash	
Phosphorous Pentoxide, P_2O_5	0.04 - 1.3
Silica, SiO_2	44.0 - 73.0
Ferric Oxide, Fe_2O_3	2.0 - 11.0
Alumina, Al_2O_3	4.0 - 27.0
Titania, TiO_2	0.2 - 1.5
Lime, CaO	2.0 - 13.0
Magnesia, MgO	0.2 - 5.0
Potassium Oxide, K_2O	0.2 - 0.5
Sodim Oxide, Na_2O	0.2 - 3.2

Source: IPP, 1976.

TABLE 1-7

Plant Waste Water

Sources	Average Quantity (gal/min)
Cooling tower blowdown	300
Demineralizer and make-up softeners	160
Various maintenance wash waters	200
Storm runoff	15
Total	675

The total annual plant waste water volume would average 1,100 acre-feet. This water would be evaporated in order to meet the criterion of "zero discharge" of waste water to surface or ground water bodies.

The evaporation ponds would be located in the northwest portion of the plant site (see Figure 1-7) and have a net surface areas of approximately 400 acres. The total area would be divided into 10 sections of a minimum of 30 acres each, having a maximum reach of 3,000 feet to minimize wave action. The bottom of the ponds would be lined with a 1-foot layer of impermeable native clay-like soils and the sides would be lined with impervious asphalt. Figure 1-13 is a plan of the proposed ponds.

The evaporation ponds would contain all settleable and dissolved solids produced during the life of the plant (approximately 2.5 feet in depth) would permit storage of the total plant waste water for 2 years (approximately 6 feet in depth), and would provide 2 feet of free board.

g. Emission Control

(1) Main Boiler Emission Control System

The emission control system would control particulates, sulfur dioxide (SO_2), and nitrogen oxides (NOx) emissions. Table 1-8 shows estimated plant emissions.

(2) Particulate Removal System

Hot electrostatic precipitators would control particulate matter generated during coal combustion. The precipitators would remove 99.5 percent of the fly ash. In combination with particulate removal in the SO_2 scrubber, a total of 99.75 percent of the particulates would be removed.

(3) Sulfur Dioxide (SO_2) Removal System

The SO_2 removal system, a horizontal crossflow lime scrubber, would be designed to remove 90 percent of the SO_2 produced in the boilers and 50 percent of those particulates not collected by the electrostatic precipitator.

The waste sludge produced by the scrubbers would consist mostly of calcium sulfate with small amounts of magnesium sulfate, sodium sulfate, sodium

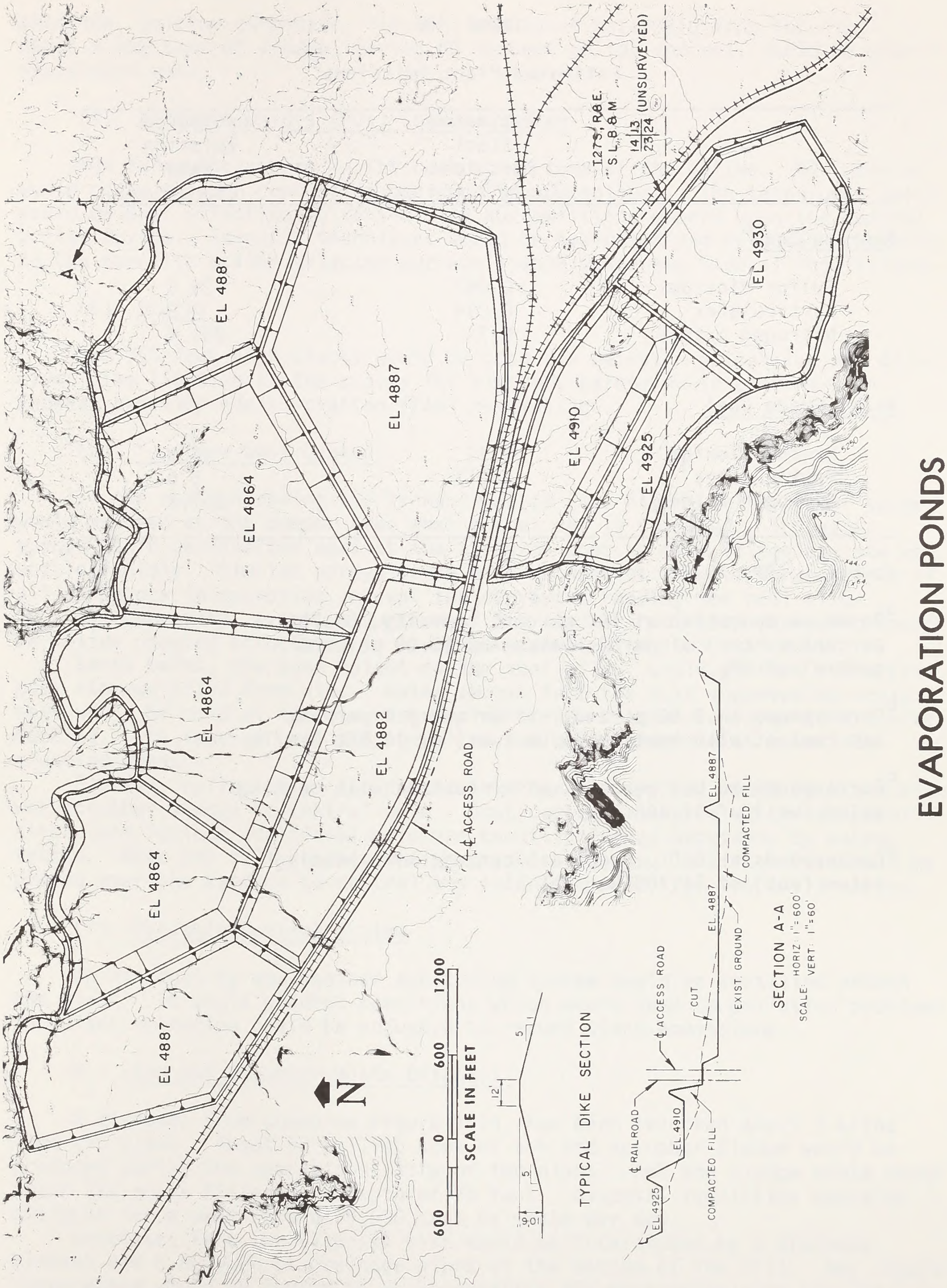

EVAPORATION PONDS
EL 4887
EL 4887
EL 4864
EL 4864
EL 4882
EL 4864
EL 4887
EL 4910
EL 4925
EL 4930
A
A
℄ ACCESS ROAD
14|13
23|24
(UNSURVEYED)
SCALE IN FEET
600
0
600
1200
N
TYPICAL DIKE SECTION
12'
5
SECTION A-A
SCALE: HORIZ: 1" = 600'
VERT: 1" = 60'
EL 4925
℄ RAILROAD
EL 4910
COMPACTED FILL
℄ ACCESS ROAD
CUT
EXIST. GROUND
EL 4887
EL 4887
COMPACTED FILL

FIGURE 1-13

TABLE 1-8

Estimated Plant Emissions[a]

	Estimated Stack Emissions (lbs/million Btu)	Estimated Emission Rate (tons/day)
Average Coal[b]		
Sulfur dioxide	0.097	29.6
Particulates	0.014	4.3
Nitrogen oxides	0.7	251.4
Worst Grade Coal		
Sulfur dioxide[c]	0.12	44.2
Particulates[d]	0.017	5.6
Nitrogen oxides	0.7	251.4

Source: IPP, 1976.

[a]Based on operation at 100 percent capacity, 99.75 percent control of particulates and 90.00 percent control of SO_2.

[b]Corresponds to 0.56 percent sulfur and 8.1 percent ash content with heating value (wet) of 11,560 Btu/lb.

[c]Corresponds to 0.7 percent sulfur content with heating value (wet) of 11,400 Btu/lb.

[d]Corresponds to 9.0 percent ash content with heating value (wet) of 11,300 Btu/lb.

chloride, calcium carbonate, fly ash, and inert materials from the lime. About 9,580 tons of sludge, having 60 percent solids content, would be produced each week.

(4) Nitrogen Oxides (NOx) Control System

NOx formation occurs in the combustion zone of the boiler. NOx control would occur through combustion modification techniques. The techniques which would be most effective in controlling NOx emissions depend upon the general boiler design. Specific techniques would be evaluated and selected according to the specific boiler selected and applicable state and federal regulations.

(5) Stacks

Two 750 foot high stacks would be used for emission dispersion and dilution. The lighting of the stacks for aircraft safety would conform with Federal Aviation Administration (FAA) regulations.

(6) Fugitive Dust Control

In the coal unloading and transport area (see Figure 1-11), water sprays would be used at the dumper area when a coal car is unloaded. The water sprays would be directed against the airborne dust to make it agglomerate and settle rapidly. Similar sprays would also be used at the discharge points of all conveyors in operation, except the conveyors feeding the coal silos.

All conveyors, except a portion of the stacker-reclaimer conveyor, would be inside covered structures in order to prevent windblown coal dust.

Earth berms, the same height as the coal piles, would protect the active coal storage piles from wind. Water sprays from the dust suppression equipment would be used at the discharge point of the stacker conveyor to minimize dusting. The reserve coal storage piles would be sprayed with a surface crusting agent.

Fly ash, collected by the particulate removal system, would be mixed with wet scrubber sludge to control dust. Dust control measures at the disposal site would include additional moisture conditioning as necessary by water trucks. When the fill reaches design grade, a layer of native soils would be placed over the surface to control any potential dust from the solid wastes.

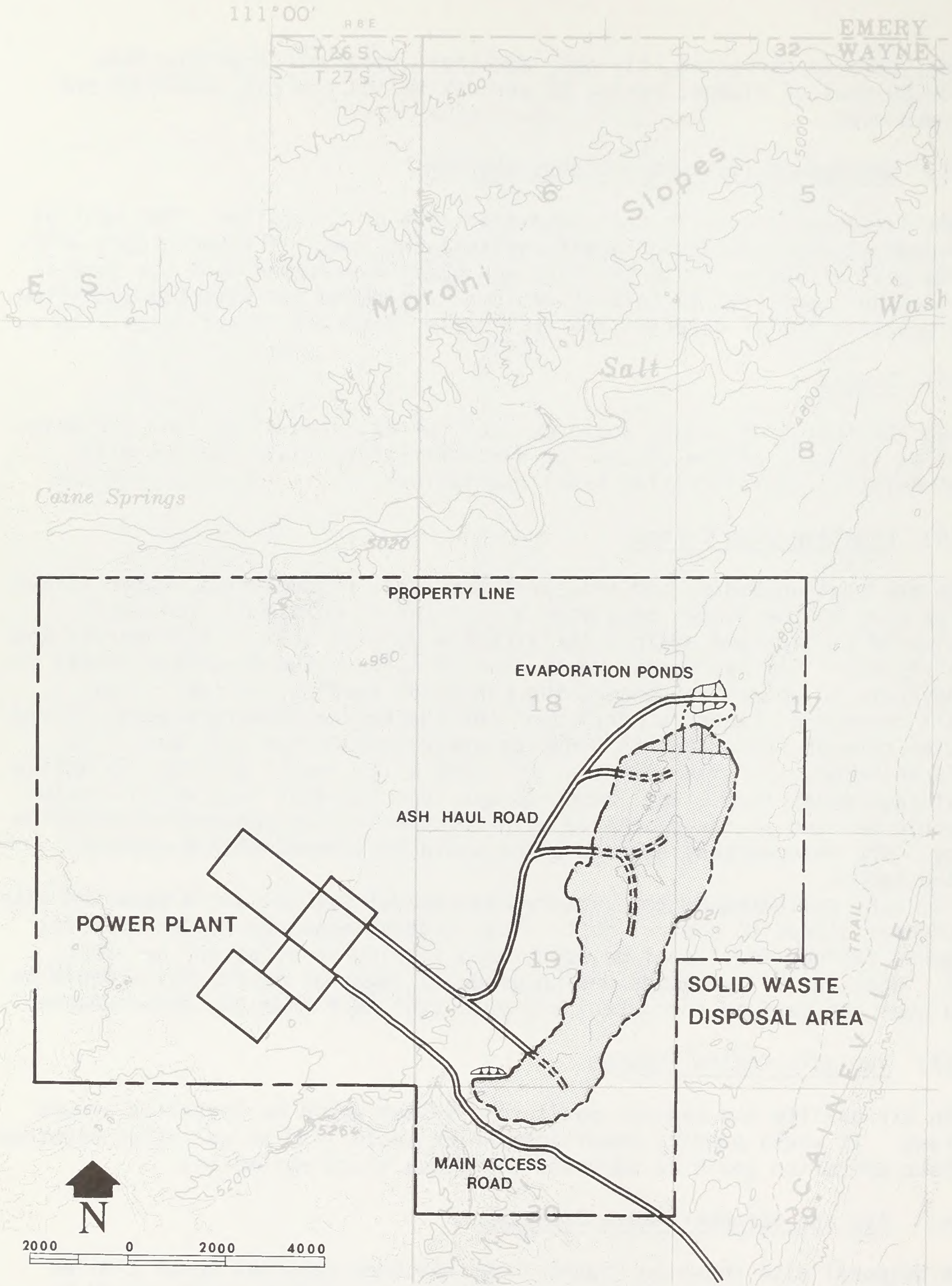
(7) Variable Control System

An air quality and weather monitoring system would be installed around the plant. It would predict conditions which would lead to pollution problems and plant operation could be adjusted to reduce stack emmissions.

h. Ash and Scrubber Waste Disposal

A disposal site shown on Figure 1-14, has been selected about 2 miles from the plant. About 53 million tons of ash and scrubber sludge would be produced during the operational life of the plant. Ash and Sludge would cover about 520 acres filled to a depth of 75 feet. Disposal facilities would be designed for a peak rate of 9,600 tons of waste per day.

Leachates from the disposal site would be intercepted by a drainage blanket and a network of drainage pipes at the bottom of the fill. Any liquid intercepted would be routed to an observation and monitoring sump and the ash



SOLID WASTE DISPOSAL

FIGURE 1-14

disposal evaporation pond. The ash disposal evaporation pond would be lined with an impermeable liner.

During placement of the fill, surface runoff would be controlled by constructing a dike and sloping the fill back toward the throat of the canyon where runoff would pond and evaporate. Should the sludge-ash mixture prove unstable, an earth fill embankment would be constructed. After an area reaches final grade, a 2-foot layer of stockpiled native soil would be placed on the surface and compacted. Final surface contours of the fill would be blended with adjacent topography. Various revegetation plans would be attempted. If revegetation is impractical, the area would be treated with soil stabilizers or would be terraced and provided with drainage structures to intercept runoff and sediments.

i. Switchyard and Converter Station

The switchyard and converter station would distribute power from the plant to the 500-kV d.c. Southern California Transmission System, to the 345-kV a.c. Utah Transmission System, and to the 69-kV a.c. water supply system.

j. Control and Instrumentation System

Centralized control and monitoring systems would be provided to optimize operation and station manning. All major equipment would be controlled from either the central control room or from local control boards.

k. Sanitary Waste System

The sanitary waste system would consist of a pipe line collection network discharging to a sewage treatment plant and an effluent discharge line leading to the sewage lagoon. The design capacity of the system would be 16,400 gal/day assuming a loading factor of 40 gal/day per person.

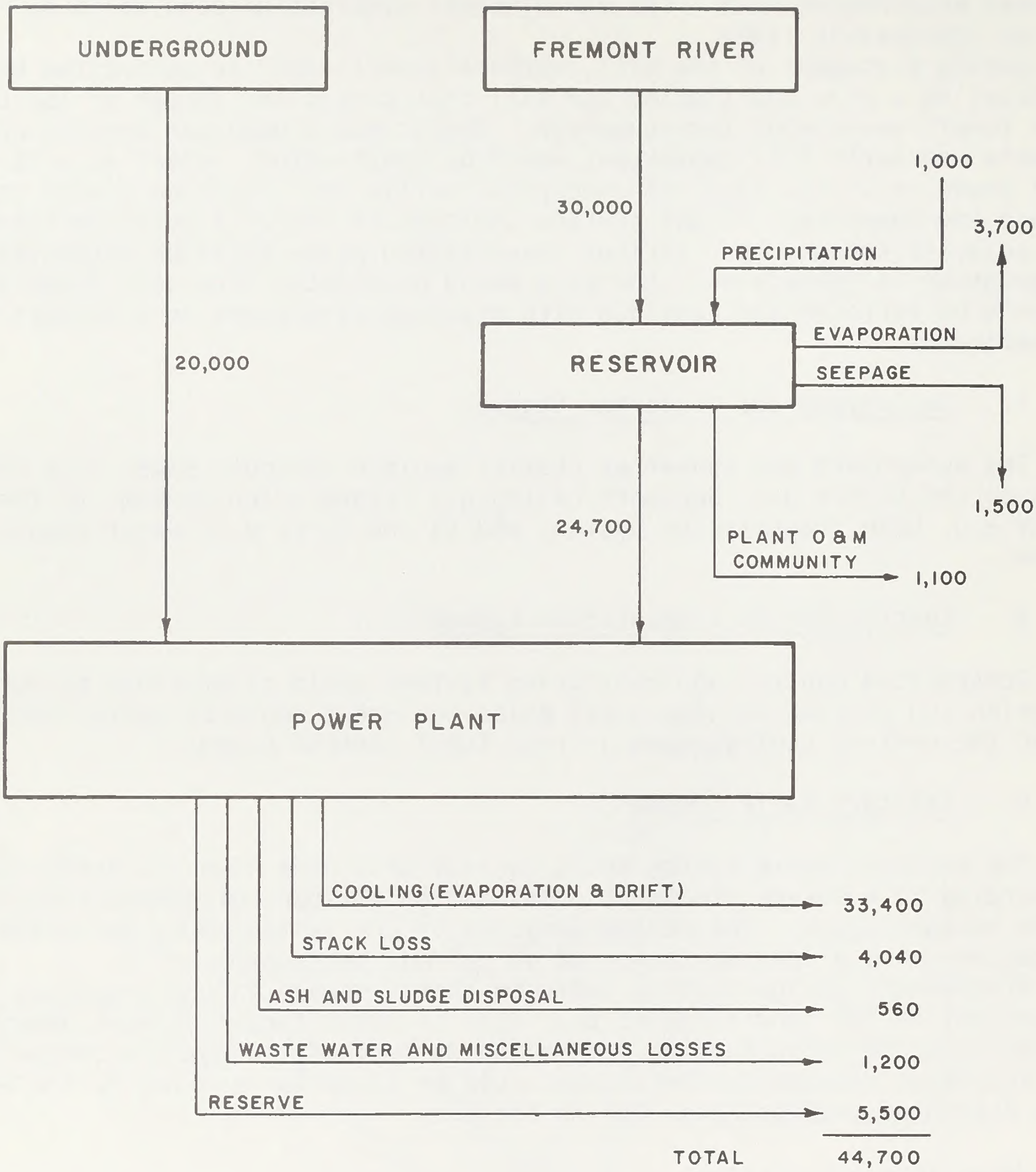
Preliminary design studies indicate that a sewage lagoon treatment system is best suited for conditions at the site. A total lagoon size of about 3 to 5 acres would be sufficient to handle the daily load. Under the criterion of zero pollutant discharge, the lagoon would be lined as required by the Utah State Branch of Environmental Health Services.

3. Water Supply Systems

Water would be obtained from two sources--30,000 acre-feet of surface water would be diverted from the Fremont River and an additional 20,000 acre-feet of ground water would be supplied by 20 wells drilled into the Navajo Sandstone aquifer. The water budget for the maximum annual usage (plant capacity factor of 85 percent) is shown on Figure 1-15.

a. Surface Water System

The surface water system would consist of a low dam to divert water from the Fremont River, a pumping station and pipeline to convey water from the river into a proposed reservoir in the Red Desert, and a second pumping station and pipe line to move water from the reservoir to a 5 million gallon storage tank at the power plant.



NOTE: ALL NUMBERS INDICATE ACRE-FEET OF WATER PER YEAR; BASED ON ANTICIPATED MEAN AVERAGES, NORMAL WEATHER CONDITIONS, AND AN 85 PERCENT PLANT CAPACITY FACTOR.

PROJECT WATER BUDGET

FIGURE 1-15

The water rights to the surface water are held by the Wayne County Water Conservancy District (WCWCD). WCWCD's Application No. 32509 (95-434) allows diversion from the Fremont River of 100 cubic feet per second (ft^3/s) of water by gravity flow and storage of 50,000 acre-feet of water annually.

According to an agreement between ICPA and WCWCD, dated August 14, 1976, ICPA (one of the participants of IPP) is entitled to purchase the first 25,000 acre-feet of the net water from the proposed diversion and storage project. WCWCD is entitled to the remaining waters from the proposed project. ICPA has the option to purchase any of those remaining waters not needed by WCWCD. Water would not be released to WCWCD when the reservoir contained less than 19,000 acre-feet of usable storage water, except to satisfy the 1,100 acre-feet annual municipal requirements at the new town.

The Fremont River diversion works and pumping station would be located on state land approximately 3 miles southwest of Caineville. About 100 acres of land would be required for the diversion works and pumping station shown on Figure 1-16.

The diversion dam would be an earth embankment about 35 feet high and 200 feet thick at the base, and would span a gorge 460 feet wide. It would have concrete wing walls and sill and a gated spillway capable of passing a 100-year flood (a flood with the probability of occurring once in 100 years). This dam would impound a regulatory water pool of 200 acre-feet from which water would be pumped to the proposed Red Desert reservoir. Fremont River normal flow would be completely diverted into the proposed reservoir during the non-irrigation months, November through March, but water would be released occasionally to fill stock watering ponds. During the irrigation months, April through October, normal flow would not be diverted.

Water would be conveyed through a 48-inch diameter pipeline northerly about 3.3 miles to the Red Desert reservoir. The pipeline, buried to a depth of 4 feet, would occupy a 100 foot wide common right-of-way.

The Red Desert dam, a compacted earth embankment, would be located about 1.3 miles northwest of Caineville in Wayne County (Visual A). The structure would impound up to 50,000 acre-feet. Sediment pool would be approximately 5,000 acre-feet.

The reservoir site would require 3,840 acres of which 3,360 acres would be public land and 480 acres state land. The reservoir itself would occupy about 1,000 acres when filled.

The water would be pumped to the power plant through a 48 inch diameter pipeline. This pipeline would occupy 10.6 miles of a 100 foot wide common right-of-way.

b. Ground Water System

A proposed system of 20 production wells, 20 observation wells, and 86 miles of pipeline would draw 20,000 acre-feet of water annually from the Navajo Sandstone aquifer. Ground water filings, shown on Figure 1-17, have been made with the Utah State Engineer in 90 sections of land not included in the plant site or the Red Desert Reservoir site. Land ownership of the area encompassed by the ground water filings is shown on Table 1-9.

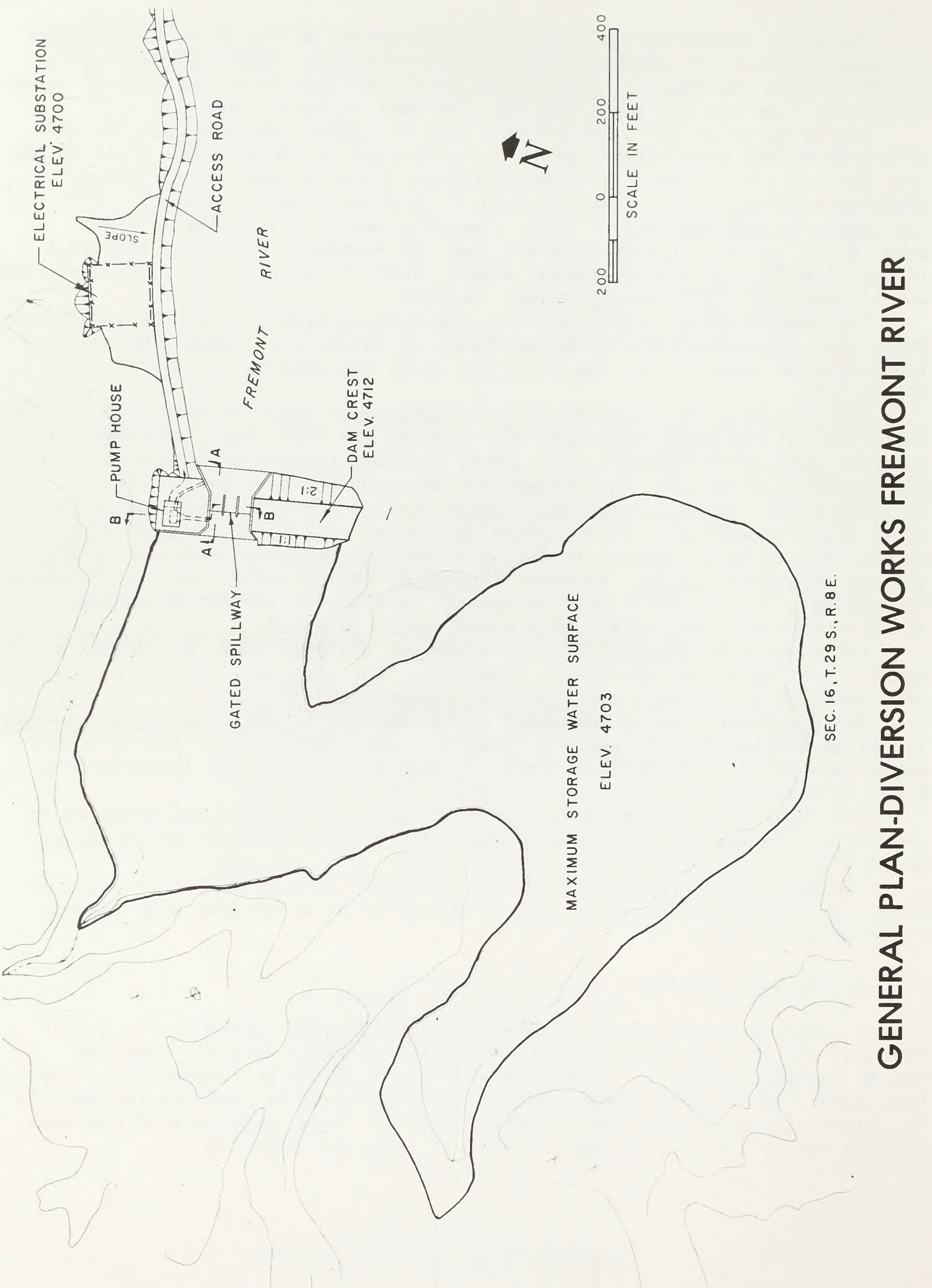
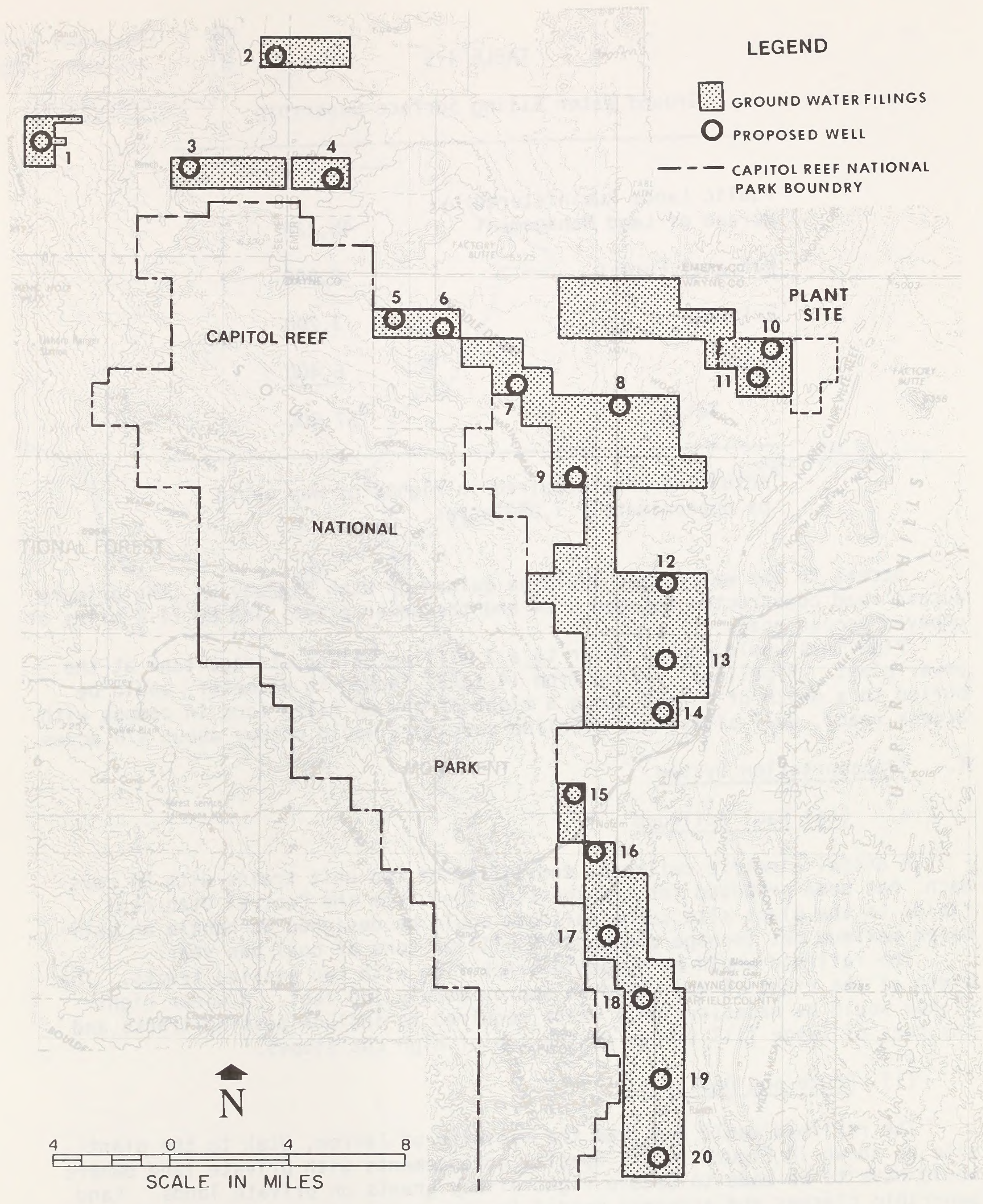

ELECTRICAL SUBSTATION
ELEV. 4700
SLOPE
ACCESS ROAD
FREMONT RIVER
PUMP HOUSE
B
A
DAM CREST
ELEV. 4712
2:1
1:1
GATED SPILLWAY
N
200 0 200 400
SCALE IN FEET
MAXIMUM STORAGE WATER SURFACE
ELEV. 4703
SEC. 16, T. 29 S., R. 8 E.
GENERAL PLAN-DIVERSION WORKS FREMONT RIVER

FIGURE 1-16



GROUND WATER FILINGS

FIGURE 1-17

TABLE 1-9

Ground Water Filing Surface Ownership

	Acres
Public Lands Administered by Bureau of Land Management	45,120
National Forest	2,880
Private	3,200
State	6,400
Total	[a]57,600

[a]Actual acreage required in rights-of-way would be approximately 1,080 acres.

Access to the well sites would be gained by Utah Highway 24, the primary access road constructed between U-24 and the power plant, and by 71.4 miles of unpaved access roads.

Pipelines would convey water to a 3 million gallon storage tank at the power plant. Pipelines, varing from 14 to 32 inches in diameter, would be buried to a depth of 4 feet along a right-of-way 86 miles long in common with access roads, well sites, and pipeline corridors would occupy about 470 acres.

4. Transportation System

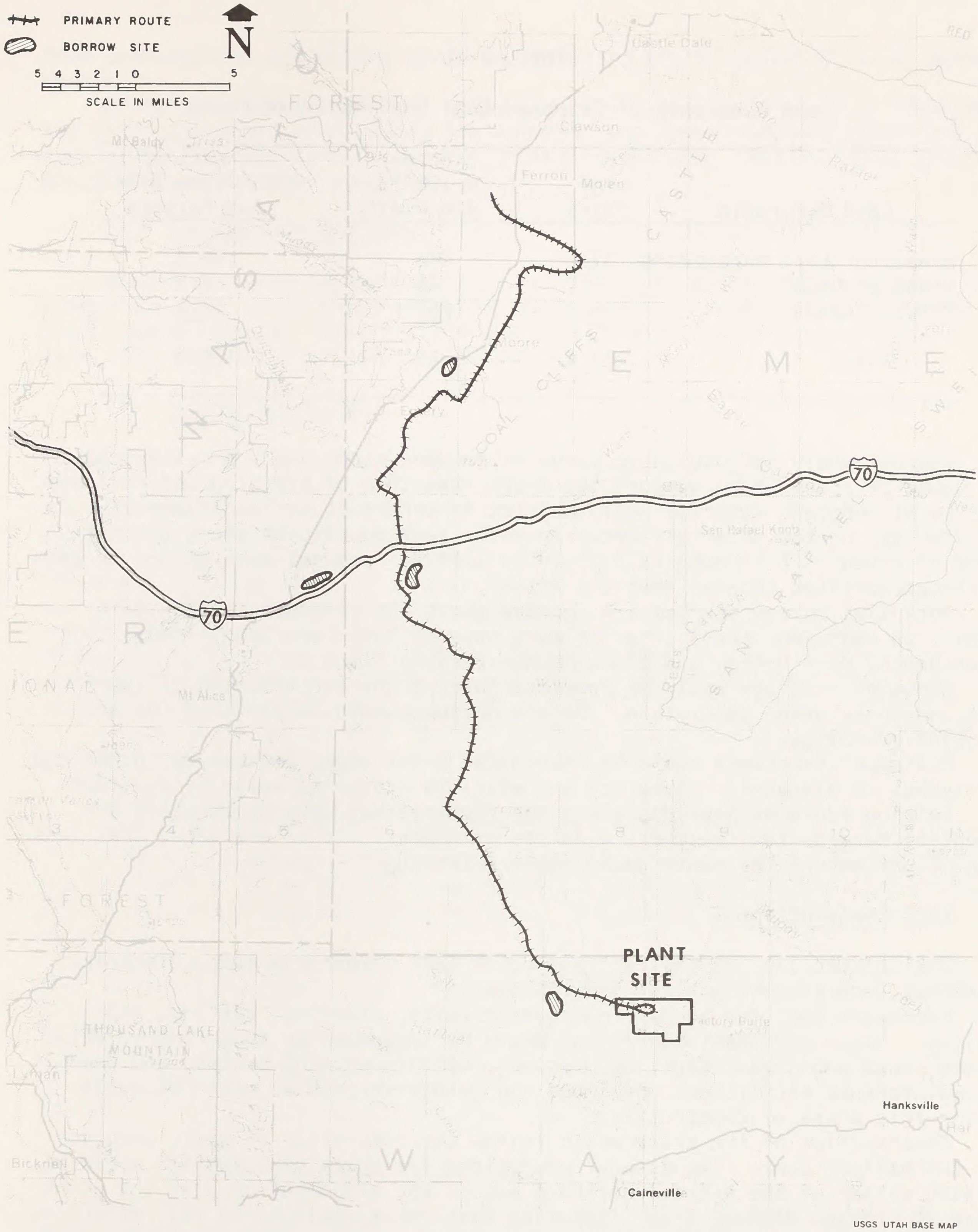
a. Coal Haul Railroad

A diesel-electric railroad, consisting of two unit trains with 84 cars each, has been proposed for transporting fuel from the Central Utah coal fields to the plant site. The railroad would be designed to handle an estimated maximum net tonnage of about 10 million tons of coal per year.

The railroad would be a single track line with two passing tracks. The width of the right-of-way would be approximately 100 feet. A wider right-of-way would be necessary only where required to include passing tracks and the toes of large fill slopes or the top of high cut slopes.

(1) Route and Design

The railroad would run from the vicinity of Ferron, Utah to the plant site as shown in Figure 1-18. Special arrangements with private land owners would have to be made to secure right-of-way grants on private lands. Land ownership classes and acreages needed for the railroad are listed on Table 1-10.



COAL HAUL RAILROAD

FIGURE 1-18

TABLE 1-10

Land Ownership of Proposed Coal Haul Railroad Route

Land Ownership	Line Miles	Acres @ 100 Ft. R/W Width	Percent of Total Line Mile And Acreage
Bureau of Land Management	37.0	448	58.4
State of Utah	5.2	63	8.2
Private Lands	21.2	257	33.4
Total	63.4	768	100.0

Approximately 597,000 cubic yards of crushed stone and sub-ballast material would be required to support the track structure of the proposed railroad.

Local subgrade material would be used to construct all embankments. Satisfactory borrow materials occur in sufficient quantities along the proposed alignment. Fill materials would be derived from cut excavations or from local borrow sites located near the fills.

Potential borrow sources are located along the alignment (see Figure 1-18). In addition, three other primary sources have been identified: Ivie Creek Bench, Mesa Butte, and Black Mountain sites A and B.

Highway crossings would be provided through the construction of overpass/underpass grade separation. Safety devices would be provided for any at-grade crossings.

Drainage structures would be corregated metal pipes between 36 inches and 120 inches in diameter. Livestock and wildlife crossings would be provided.

Fencing would be provided along the right-of-way only where there are potential hazards to livestock, wildlife or humans. It is estimated that less than 10 percent of the route would require fencing.

(2) Construction

The construction of the railroad would fall into three main categories: earthwork, track construction, and cleanup.

Earthwork includes access road construction, clearing, cutting, and filling. Heavy equipment operations would be supported by dust control water trucks, fuel and grease rigs, compressors, utility pick-up trucks, and temporary maintenance facilities. Drainage and bridge structures would be built during this phase of construction.

Construction of the track would follow the completion of basic subgrade and sub-ballast work. The base of operations for track construction would be located either at the extreme northern end of the alignment or near the point where it crosses Highway I-70. Assuming that there would be no rail extension from the Price area, all materials, such as rails, ties, and tie plates would be shipped by rail to Green River and then trucked to the staging area. Signal systems, safety and detection devices, etc., would be installed during track construction.

Final construction efforts would consist of cleanup and revegetation. Work and haul roads would be regraded and obliterated as required. All debris

from construction activities would be collected and disposed of in an approved manner.

Efforts at revegetation of abandoned haul roads, borrow pits, embankments and other disturbed areas along the right-of-way would commence after the completion of the grading and track laying operations. Native plant species would be used wherever possible.

(3) Locomotives and Cars

Diesel-electric locomotives are proposed, but an evaluation between a diesel-electric and a 50-kV electric system would be made during the railroad's design phase. Cars for the unit train would be of the open gondola type with a capacity of 100 tons of coal.

(4) System Operation

Each of the two unit trains would have four locomotives, two tractive effort booster units, 84 coal cars and a caboose. The trains would have a maximum speed of 45 miles per hour loaded and 55 miles per hour maximum empty. Loaded trains would average about 24 mph over the 63 mile route. Two trains--making two trips per day, five days a week--could supply enough coal to fuel the plant. During years of higher demand, the coal transportation system would be required to operate six days a week.

Two sidings along the alignment would be provided for passing of the 4,870 foot long trains. Each of the sidings would be 8,000 feet in length. A 2,000-foot backtrack would also be provided at the sidings for temporary storage of maintenance and support equipment.

Diesel fuel consumption for the IPP coal haul railroad would be about 2,474,000 gallons per year.

(5) Coal Conveyance and Loading System--Mine to Train

Each mine would provide its own transportation system to the IPP coal haul railroad. In areas where several mines might be developed, it is likely that a single conveyance system would be constructed to handle the output from each area.

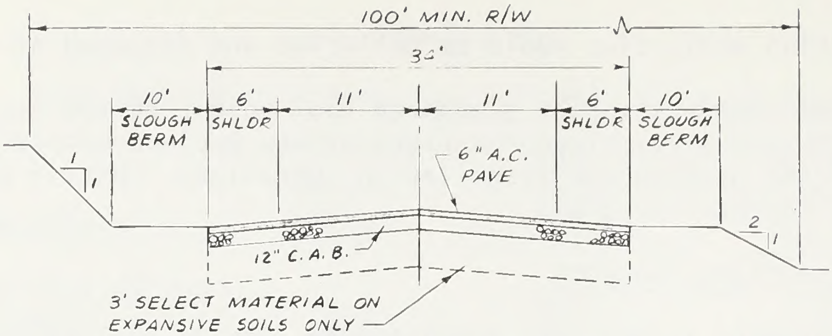
It is estimated that at least two and possibly three coal loading facilities would be required. The northernmost facility would be located at the proposed terminus southwest of Ferron. Additional loading stations would be located near Emery and the junction of Highways I-70 and U-10.

A coal sampling and weighing system would also be incorporated in the loadout stations. Active storage at the stations would be set at 1 to 4 days (25,000 to 100,000 tons) maximum coal supply.

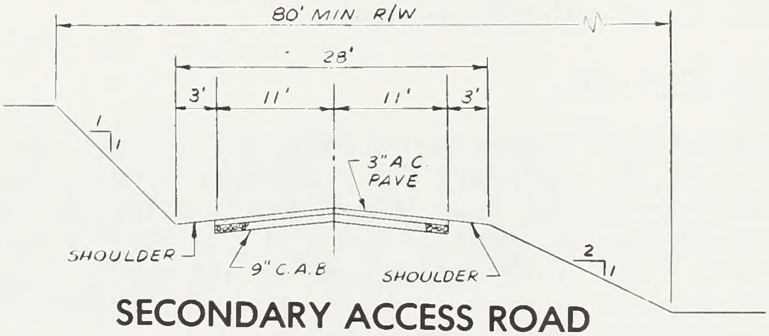
b. Primary Project Area Road System

The road system for the project would consist of the four basic types shown on Figure 1-19. The road components, types and other data are presented on Table 1-11.

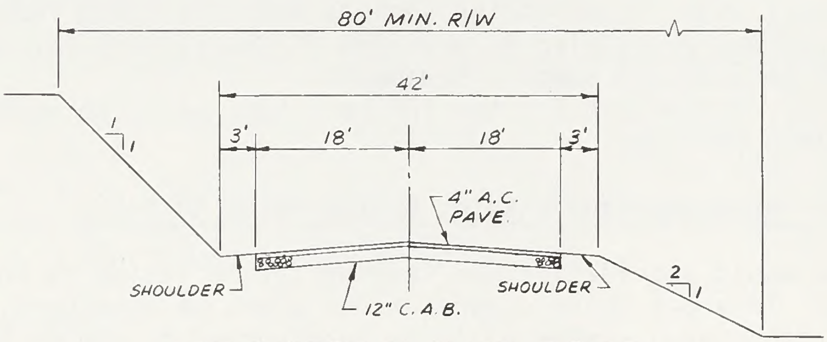
A new permanent hard-surface access road approximately ten miles long would provide plant access. The road would be designed for a safe speed of 55 miles per hour and for the heaviest anticipated equipment loads. The design would be the "primary access road" shown on Figure 1-19 and would include the water supply and power supply lines in its right-of-way . Culverts and cross drainage would be designed for a 50-year flood.



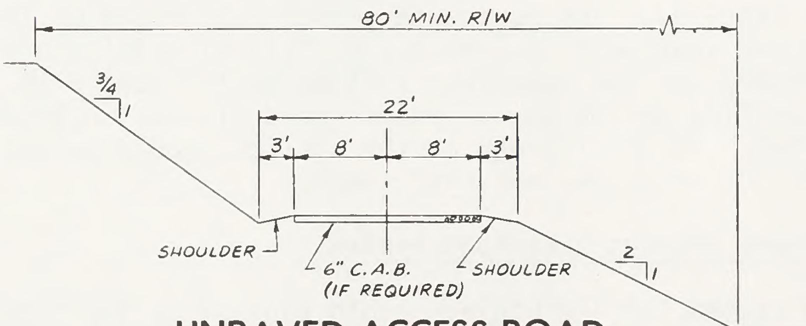
PRIMARY ACCESS ROAD



SECONDARY ACCESS ROAD



ASH DISPOSAL HAUL ROAD



UNPAVED ACCESS ROAD

ROADS-TYPICAL CROSS SECTIONS

FIGURE 1-19

TABLE 1-11

Primary Project Area
New Roads

Component	Length in Miles[a]	Type of Road[b]	Acres Occupied
Plant Access Road (Caineville to Plant site)	10	Primary Access	121
(Highway 24 via New Town to Plant Site)	7	Secondary Access	68
Red Desert Reservoir			
Paved	7.9	Secondary Access	74
Unpaved	2.0	Unpaved Access	22
Diversion Works Access	0.5	Paved Access	1
Well Field Roads	86	Unpaved Access	417
Ash Haul Roads at Plant Site	3	Ash Haul Road	29
Microwave Station Roads			
Moroni	2	Unpaved Access	24
Elkhorn	0.5	Unpaved Access	1
Borrow Haul Roads	3 (Temp)	Unpaved Access	29
New Town Streets	33	Paved Roads and Streets (cross sections not shown)	241

[a]The length includes mileage inside other rights-of-way.

[b]See Figure 1-19.

c. Construction Delivery and Transportation

The proposed equipment delivery railhead would be located about 70 miles northeast of the proposed plant site and 1 mile west of Green River, Utah. Most of the land at the delivery site is privately owned and would require grading and temporary fencing. When the railhead is no longer needed, the area would be restored.

A suitable route for heavy or excess clearance construction loads would be developed from the proposed railhead. Detours and temporary fords of water courses in the vicinity of highway bridges would be possible.

If the proposed coal haul railroad could be tied into a mainline railroad, equipment and construction material could be delivered by rail directly to the plant site.

5. Power Transmission Systems

The IPP transmission system would consist of the two subsystems shown on Figure 1-20. (Appendix I-3 contains a more detailed set of maps of the proposed route.) The Southern California transmission system would transmit power from the proposed plant site to the Victorville Converter Station where the power would be distributed to the California participants along existing routes. The Utah transmission system would deliver power to Utah, southern Wyoming, and Nevada participants. The acreage requirements for the proposed transmission systems are listed in Appendix I-4.

a. Southern California Transmission System

(1) Routing

Two 500-kV d.c. transmission lines from the proposed generating station would be constructed to the Victorville, California converter station.

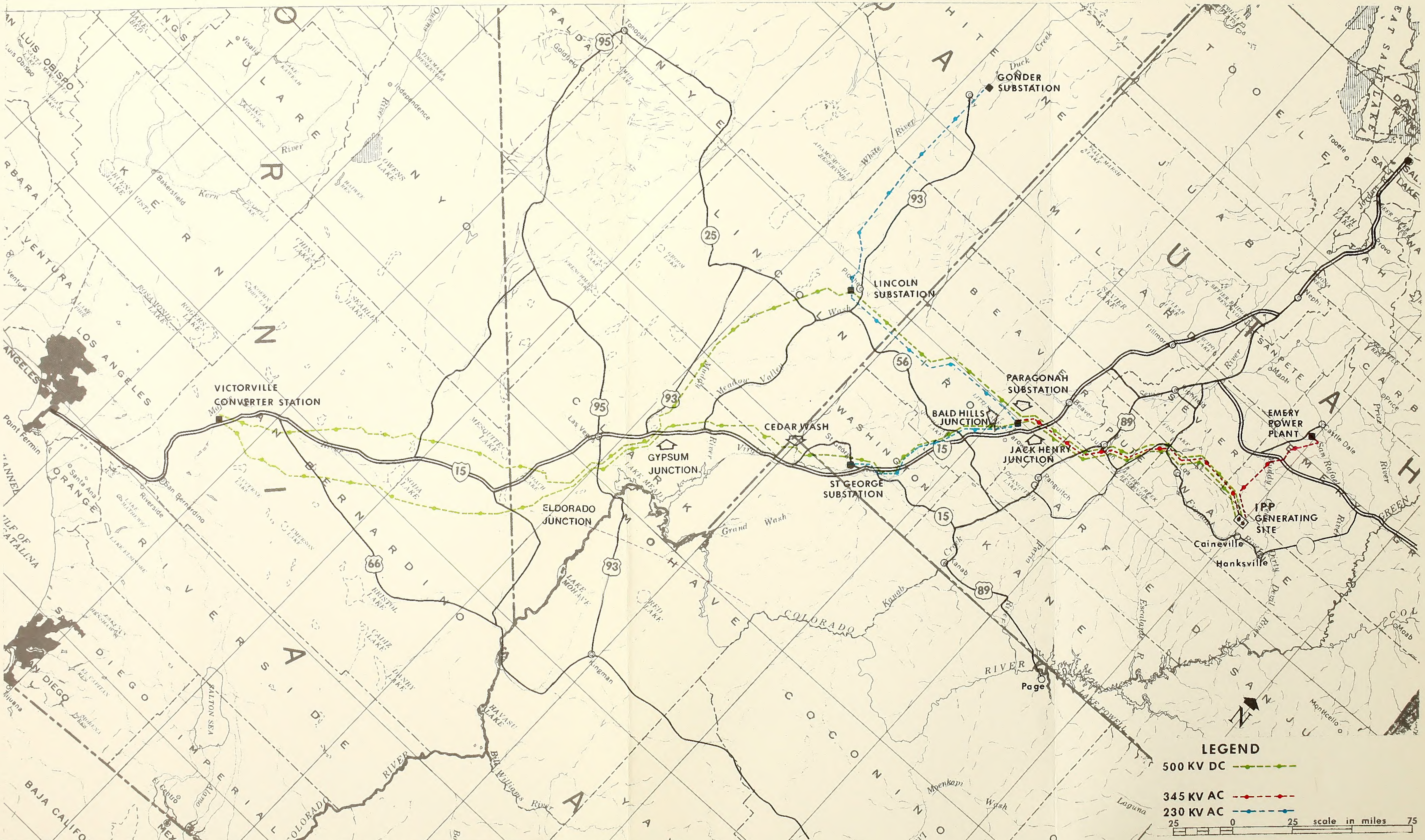
The right-of-way requirements and land status for the Southern California transmission system are listed in Table 1-12. Approximately 24,200 acres total would be required. Appendix I-5 lists land status by line segments.

(2) Transmission Line Size and Design

Towers for the new 500-kV d.c. transmission lines would be free-standing lattice-type made of unpainted galvanized steel. Appendix I-6 depicts typical towers. These towers would support two overhead ground wires and two pairs of conductors. Each conductor would consist of a 1.8-inch diameter composite of aluminum wires over a steel wire core. The average span length would be approximately 1,400 feet (about four towers per mile).

(3) Access and Service Roads

This part of the project would require 1,065 miles of access roads. Because of proximity to other corridors, 380 miles of existing roads would be used. About 685 miles of new access roads would be constructed along the transmission line right-of-way (see Appendix I-4). The new access roads would consist of a main road running the length of the right-of-way with stub roads providing access to each structure. In some cases, it would be necessary to locate access roads outside the right-of-way due to geological, ecological, or topographical considerations. These conditions may be expected to exist over



TRANSMISSION LINES

FIGURE 1-20

TABLE 1-12

Transmission Line Right-of-Way Needs
Land Status - Southern California Transmission System

Transmission Line	Total Length (mi)	Land Status (mi) BLM	Bureau of Reclamation	Forest Service	State[a]	Private	(Approximate Acres)
Southern California Transmission System							
Line 1	395	331			11	53	7,915
Line 2	366	267	1		19	79	9,424
Common Route	144	107	4	19	8	6	5,992
Total	905	705	5	19	38	138	23,331

Source: Appendix I-4.

[a]State of Utah and California.

approximately ten percent of the area where new roads are required, resulting in approximately 50 miles or 85 acres of access roads outside the right-of-way.

IPP would also require legal access from existing roads or highways to the transmission line right-of-way at intervals not to exceed ten miles. Permits for the use of existing roads or trails would be obtained wherever possible. It is estimated that an additional 30 miles, or 51 acres, of new roads would be required.

(4) Construction Phases and Activities

Pre-construction and construction activity would continue year-round. Prior to actual line construction, the facilities would be surveyed. Where necessary, the access road would be cleared of vegetation and wire let-down gates installed on all existing range and farm fences.

Some construction facilities would require removal of vegetation, grading or leveling, compaction, placing crushed rock, fencing, and development of utilities. About 0.9 acres of vegetation would be disturbed at each tower site. Existing sites would be used when possible.

Land requirements for temporary construction facilities which would be located off the transmission line right-of-way are:

> Project Offices--These offices would consist of trailers or rented facilities convenient to the transmission line right-of-way. Approximately three project offices would be needed and would require about 3 to 5 acres of land each.
>
> Field Offices and Reporting Yards--These offices would be housed in trailers at sites close to the transmission line right-of-way. They would require about 2 acres of land at each site and would be spaced about 25 miles apart. They would be moved as line construction progresses.
>
> Storage Yards--These yards would be required for storage of transmission line materials and would be located with field offices and reporting yards. About 3 to 5 acres of additional land would be required for each yard.
>
> Concrete Batch Plants--Portable concrete batch plants would be used where concrete from local ready-mix plants is not available. The batch plants would be set up every 10 to 15 miles where concrete is required and would be moved when concrete work is completed on a particular portion of the transmission line. Less than 1 acre of land would be required at each site.

Actual line construction would involve installing footings, erecting towers, installation of insulators, stringing conductor, and grounding towers where needed. The construction crews could be divided into several segments each working simultaneously along the line. No more than twenty persons would work on a tower site.

Water for dust control, concrete, and other construction needs would be obtained from existing sources along the right-of-way and transported to the work locations by water trucks. In all cases, the necessary permits or permission from the owners of the water rights would be obtained.

(5) Maintenance

Maintenance includes all operations needed to keep the lines and associated facilities in operation. Maintenance consists of periodic patrols by air (approximately 4 times per year) and an annual ground patrol. Emergency maintenance would be performed in the event of any line failure.

b. Utah Transmission System

The Utah transmission system would transmit power to the ICPA members, UP&L, and Price City. It would consist of 188 miles of new single-circuit 345-kV a.c. transmission line and 258 miles of new single-circuit 230-kV a.c. transmission line. Existing facilities would be used to distribute power from the Emery, Paragonah, St. George, and Gonder substation to ICPA participants, UP&L, and Price City.

(1) Routing

The proposed route for the transmission system from IPP to the Utah participants (see Figure 1-20) consists of:

one 345-kV a.c. line constructed from IPP to UP&L's Emery power plant near Castle Dale, Utah. It would interconnect with existing or proposed UP&L transmission systems, which in turn would transmit power to many of the ICPA participants.

one 345-kV a.c. line constructed from IPP to the proposed Otter switching station, where it would interconnect with the UP&L Glen Canyon-Sigurd transmission line, and continue to the existing California Pacific Paragonah substation near Parowan, Utah.

one 230-kV a.c. transmission line from the Paragonah substation to the existing Gonder substation near Ely, Nevada.

one 230-kV a.c. line constructed from the Paragonah substation to the proposed St. George substation in St. George, Utah.

A detailed listing by segments of the right-of-way may be found in Appendix I-7.

(2) Transmission Line Size and Design

Structures for the 345-kV a.c. transmission line and the 230-kV a.c. transmission line would be free-standing wood H-frames. Typical structures are shown in Appendix I-8. Approximately seven wood pole structures per mile would be required.

The 345-kV a.c. structures would support one or two overhead ground wires and six conductors (three pairs). Each conductor would be a 1-inch diameter composite of aluminum wires over a steel rope. The 230-kV a.c. structures would support three conductors.

Construction of the St. George substation near the city of St. George, Utah would require approximately 5 acres of private land. One acre of additional private land would be required at the existing Paragonah substation. The proposed Otter switching station would be on approximately two acres of public land near Angle, Utah.

(3) Access and Service Roads

IPP proposes to construct approximately 260 miles of new access road along the proposed transmission line right-of-way where the Utah and Southern California transmission lines do not share the same right-of-way (Appendix I-4). Approximately 260 miles of the Utah transmission system would make use of Southern California transmission system roads with only spurs to the tower sites being required. The new roads would be constructed within the right-of-way unless terrain or soil conditions require modification. These conditions may be expected to exist over about 15 percent of the area where new roads are required resulting in 40 miles or 67 acres of access roads outside the right-of-way.

Access to roads along the transmission line rights-of-way would be required from existing roads or highways at intervals not to exceed 10 miles. Wherever possible, permits would be obtained to use existing roads or trails. It is anticipated that about 15 miles, or 25 acres, of new access roads to the transmission line right-of-way would be required.

(4) Construction Phases and Activities

Construction phases and activities for the Utah transmission system would be the same as for the Southern California transmission system except: no portable concrete batch plants would be required, the area cleared of vegetation for tower sites would only be 0.25 acres, and wood poles structures would be used in place of steel towers.

(5) Maintenance

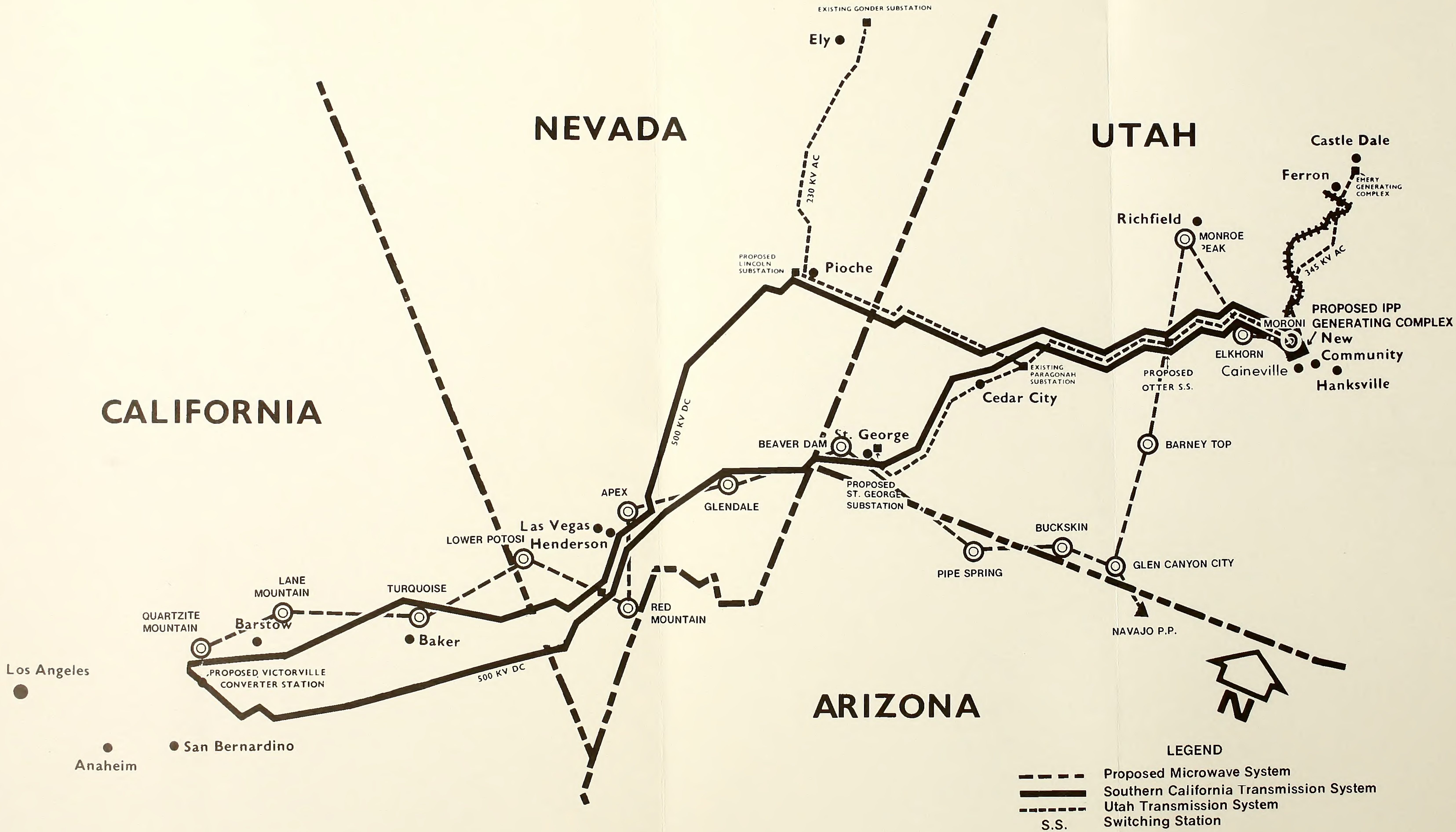
Maintenance would be the same as described for the Southern California transmission system.

c. Microwave Communication System

The microwave system would provide communication channels for transmission line relay protection and dispatching, scheduling, and maintenance. The system is shown on Figure 1-21.

(1) Terminal Stations

Terminal stations would be at the IPP plant site and Victorville, California. The electronic equipment would be in the switchyard control buildings. Antennas and supporting structures would be located within the terminal stations.



PROPOSED MICROWAVE SYSTEM

FIGURE 1-21

(2) Repeater Stations

The Moroni repeater station would be built at a new site on public land approximately 4 miles northwest of the plant site. The equipment would be housed in a prefabricated building next to an 170 ft. high antenna support tower. Power would be provided by a 2 mile extension at the plant distribution system. About 2 miles of new access road would be constructed from an existing road to the station site.

The Elkhorn station would be constructed at a new site within the Fishlake National Forest. The equipment would be housed in an 8 ft by 22 ft prefabricated building. Four antennas would be supported on an adjacent tower approximately 70 ft high. Power would be supplied by a 14 mile extension of an existing single wood pole power line. A 1/2 mile new access road would be constructed from the existing Forest Service road to the site. The power line would follow road alignment.

The Monroe Peak station would be located at an existing electronic site within the Fishlake National Forest about 7 miles southeast of Monroe, Utah. The equipment would be housed in a prefabricated building. Four antennas would be installed on an adjacent 70 ft high tower. Power would be available from a short underground extension of an existing power line. Existing Forest Service roads located on Monroe Peak would provide access.

The Barney Top station would be located at an existing approved electronic site within Dixie National Forest about 1.6 miles west of Escalante, Utah. The equipment would be housed in a prefabricated building. A tower, about 70 ft high, would be installed with four antennas. A primary overhead power distribution system is available. An existing Forest Service road provides site access.

Additional equipment would be installed at Glen Canyon City, Buckskin, Pipe Spring, Beaver Dam, Glendale, Apex Peak, Red Mountain, and Quartzite electronic sites to handle the additional circuits required by the IPP system.

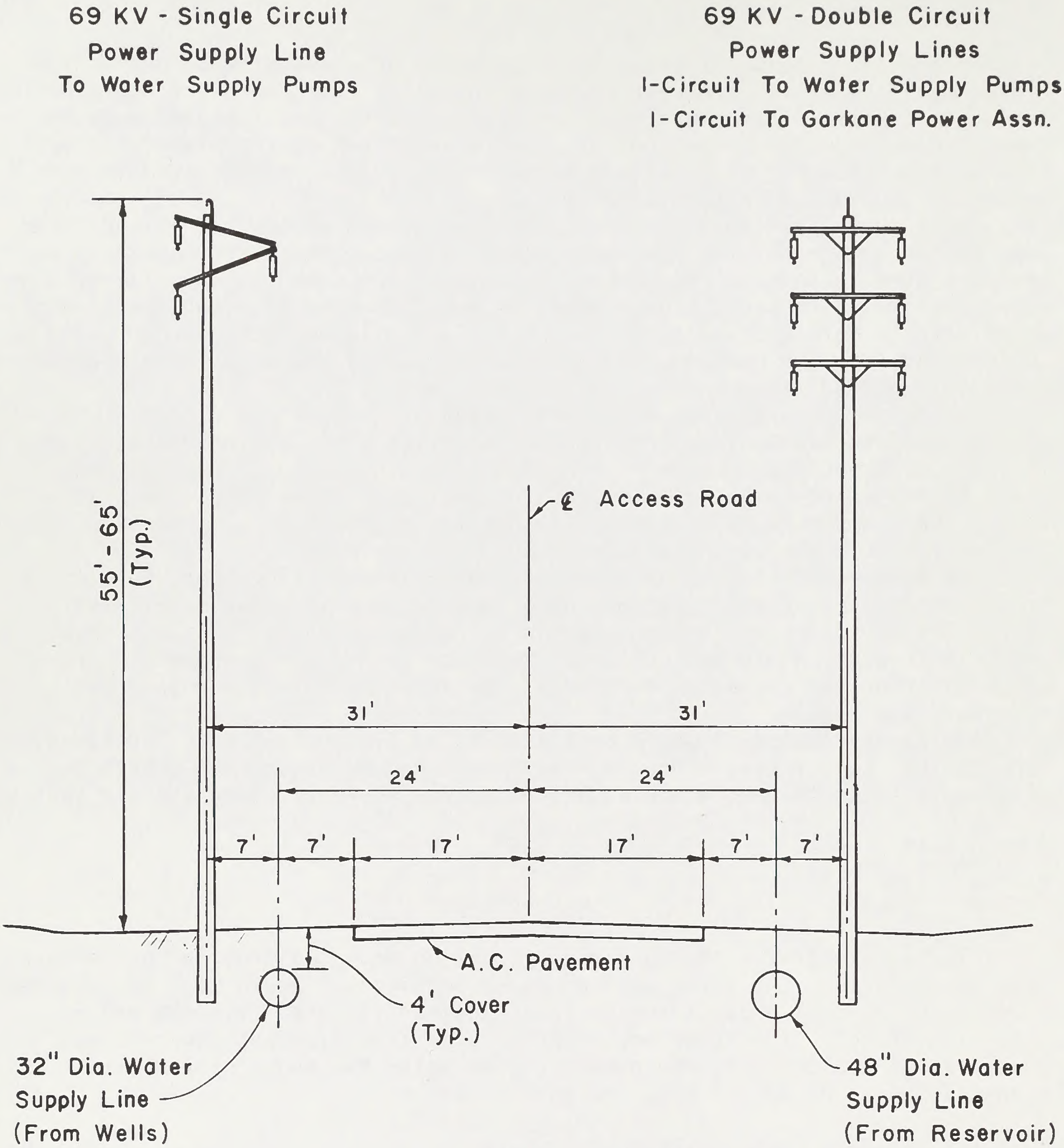
6. Utilities

a. Power Line for Plant Site Construction Power

Electrical service needed for construction would be provided by Garkane Power Association, Inc. The maximum power requirement would be 5 MW. Garkane Power Association's present system in the Caineville area is 69-kV and an extension of this line could serve IPP's needs if sufficient power is available. Power would be delivered to the plant site via the proposed 69-kV transmission lines adjacent to the main access road.

a. Project Power Distribution System

Power for well pumps, facilities at the proposed Red Desert reservoir, and the Moroni repeater station would be provided by a 69-kV line from the generating facility. The distribution line would be placed in a common corridor with access roads and water pipe lines. Figure 1-22 is a plan of the typical arrangement of the common corridor.



TYPICAL SECTION
UTILITY CORRIDOR PLANT ACCESS ROAD

FIGURE 1-22

7. New Town

Proponents of the project endorse planning for a new community in central Wayne County, Utah, in the vicinity of Caineville. Preliminary studies jointly completed by IPP and Wayne County officials point out the need for a new community to accomodate about 85 percent of the project related population growth. Estimates indicate that peak IPP related populations in Wayne County could reach approximately 9,000 people during construction periods, including primary and secondary work forces and their families. About 15 percent of the new population would find housing and other basic needs in small communities scattered throughout Wayne County. This also would require the construction of new dwellings. The long-term new town population would be approximately 3,100.

The Wayne County Master Plan adopted October, 1976, reflects the desire for orderly, managed growth. The following is quoted from the Master Plan:

2. Population Growth

   a. A new town should be built near the proposed power plant site if the power project is constructed.

   b. Adequate housing should be available in the new community or in existing communities to accomodate population growth.

   c. People moving into the County should also be encouraged to live in existing towns.

   d. Major resource development companies should bear the major cost of improving utilities and providing community facilities for new towns through prepayment of taxes to Wayne County or other acceptable methods.

a. Proposed Site

The proposed site is located on Factory Bench (Visual A) and would occupy 1,080 acres of public land.

b. New Town Development Plan

Joint planning efforts have been divided into phases:

I - Preliminary Studies
II - Conceptual Planning
III - Final Design
IV - Community Development

Figure 1-23 details the planning effort. The preliminary studies are essentially complete.

Phase II-Conceptual Planning would begin after approval of the project by the Secretary of Interior. Wayne County Commissioners and IPP have agreed to continue joint planning efforts if the Salt Wash site is approved.

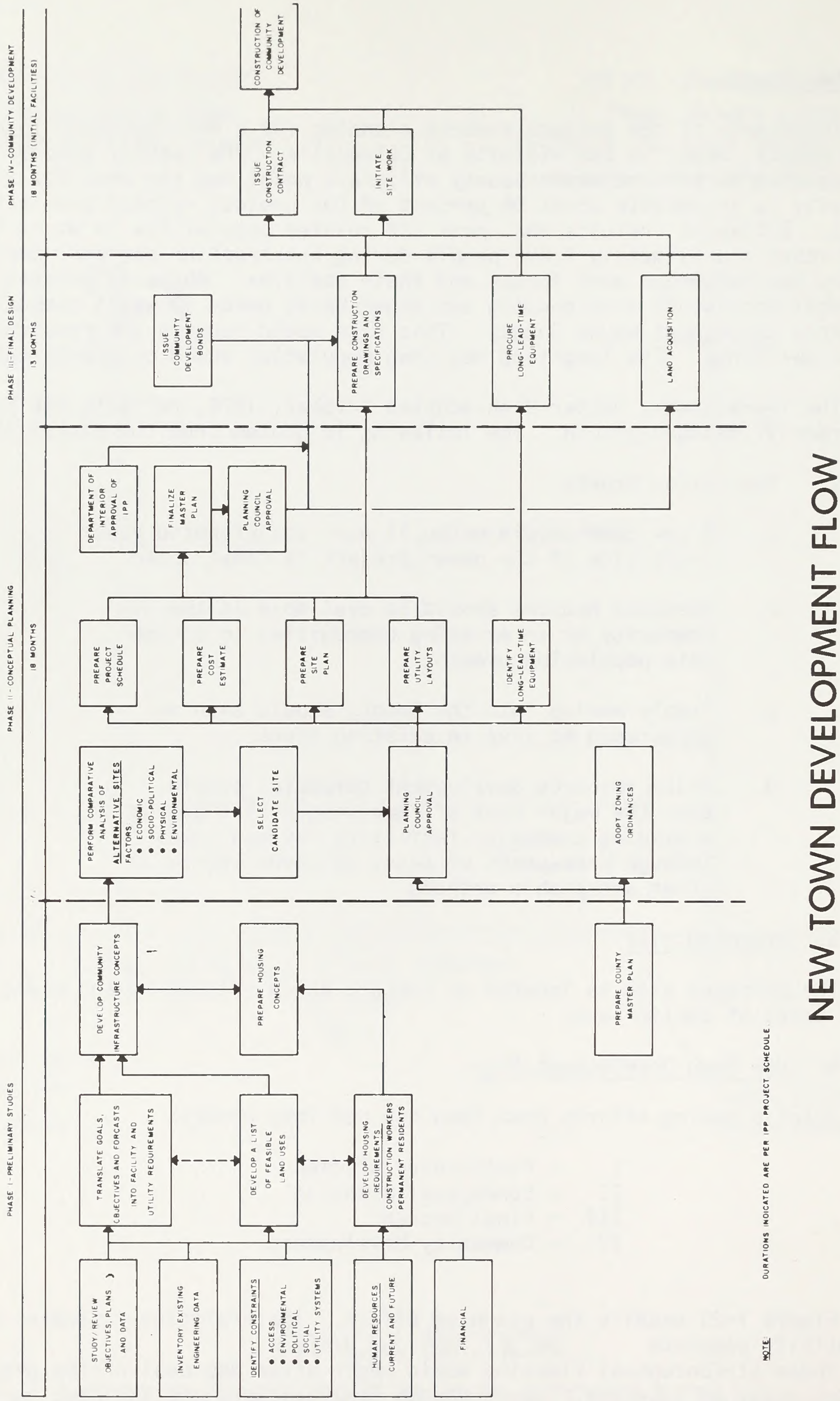

NEW TOWN DEVELOPMENT FLOW
PHASE I - PRELIMINARY STUDIES
PHASE II - CONCEPTUAL PLANNING
18 MONTHS
PHASE III - FINAL DESIGN
13 MONTHS
PHASE IV - COMMUNITY DEVELOPMENT
18 MONTHS (INITIAL FACILITIES)
STUDY/REVIEW OBJECTIVES, PLANS AND DATA
INVENTORY EXISTING ENGINEERING DATA
IDENTIFY CONSTRAINTS • ACCESS • ENVIRONMENTAL • POLITICAL • SOCIAL • UTILITY SYSTEMS
HUMAN RESOURCES CURRENT AND FUTURE
FINANCIAL
TRANSLATE GOALS, OBJECTIVES AND FORCASTS INTO FACILITY AND UTILITY REQUIREMENTS
DEVELOP A LIST OF FEASIBLE LAND USES
DEVELOP HOUSING REQUIREMENTS CONSTRUCTION WORKERS PERMANENT RESIDENTS
DEVELOP COMMUNITY INFRASTRUCTURE CONCEPTS
PREPARE HOUSING CONCEPTS
PREPARE COUNTY MASTER PLAN
PERFORM COMPARATIVE ANALYSIS OF ALTERNATIVE SITES FACTORS • ECONOMIC • SOCIO-POLITICAL • PHYSICAL • ENVIRONMENTAL
SELECT CANDIDATE SITE
PLANNING COUNCIL APPROVAL
ADOPT ZONING ORDINANCES
PREPARE PROJECT SCHEDULE
PREPARE COST ESTIMATE
PREPARE SITE PLAN
PREPARE UTILITY LAYOUTS
IDENTIFY LONG-LEAD-TIME EQUIPMENT
DEPARTMENT OF INTERIOR APPROVAL OF IPP
FINALIZE MASTER PLAN
PLANNING COUNCIL APPROVAL
ISSUE COMMUNITY DEVELOPMENT BONDS
PREPARE CONSTRUCTION DRAWINGS AND SPECIFICATIONS
PROCURE LONG-LEAD-TIME EQUIPMENT
LAND ACQUISITION
ISSUE CONSTRUCTION CONTRACT
INITIATE SITE WORK
CONSTRUCTION OF COMMUNITY DEVELOPMENT
NOTE: DURATIONS INDICATED ARE PER IPP PROJECT SCHEDULE

FIGURE 1-23

c. Proposed Facilities

Proposed facilities for the planned community can be found in Table 1-13.

d. Financing

New town development would be financed under existing Utah laws which allow for use and sales tax prepayment for schools and roads, establishing of special service districts, and making grants and loans. It is also estimated that the total costs of municipal service would be within the bonding capacity of the County if the project is approved.

8. Construction and Permanent Work Force

Construction and operation would require employment for the following project components: plant complex, coal transportation, transmission and communication systems, as shown on Table 1-14. Personnel would most likely live near their work areas. Most of the workers would be recruited from Utah if possible. During peak construction (1986), a total of 3,360 employees would be needed, although not located at the same location.

a. Generating Station

Peak direct construction employment at the plant complex itself would reach 2,520 during the construction phase. The Utah State Employment Security Office estimates that up to 90 percent of the manual labor force and 30 to 40 percent of the non-manual labor force could be recruited in Utah. When the plant is in full operation, a total of 550 operators would be required, as shown on Table 1-15.

b. Coal Transportation System

The estimated peak construction labor force would be about 430 workers. An operating force of 60 would be required. A large portion of the manual labor force would be supplied by the Utah labor pool with the majority of the non-manual workers and operating engineers from out-of-state. Construction workers would reside primarily in Emery County. Some workers would move to other communities as the construction progressed. Most of the operating and maintenance personnel for the coal haul railroad would reside in the new town in Wayne County.

c. Transmission, Communication Systems, and Victorville Converter Station

A maximum of 984 construction workers would be required in 1984 for the combined Utah and Southern California Transmission Systems. Permanent operating and maintenance employment for the transmission systems would be four workers and would be reached in 1989.

The transmission lines would be constructed in several segments and the workers would move along the particular segment. Existing communities would provide housing in commercial rental units, travel trailers, or mobile homes. Units would be individually owned or rented. Where commercial lodging is unavailable within a reasonable distance from the construction site, the contractor would be required by IPP to provide camps to accommodate the workers.

TABLE 1-13

Preliminary Estimate New Community Development in Wayne County

Facility	Description
Public Facilities	
Water treatment and main lines	2.20 million gallons per day treatment plant and distribution system
Sewer treatment and main lines	0.94 million gallon per day treatment plant and collection system
Storm protection	Storm drainage and erosion control, etc.
Roads and streets	9,300-foot long-arterial, 25,700-foot long-collector, 140,000-foot long-local
School	1 permanent elementary, 1 temporary elementary and expand existing junior/senior high
Medical facilities	1 10-bed hospital and temporary facility by IPP during plant construction
Police facilities	1 2,800 square foot station with police vehicles to serve permanent and temporary construction peak
Fire Facilities	1 suburban fire station (2 vehicles, 3 pumper trucks)
Solid waste disposal	1 bulldozer and 1 small office building (collection by private contractor)
Library	1 small-size permanent library with bookmobiles
Municipal building	1 permanent building to meet long range needs
Open space and recreation	1 park, 1 recreation center, 1 swimming pool, 1 camping, 2 picnic and open space site development, etc.
Access road	About 8 miles secondary road (from Highway 24 to plant site)
Private Facilities	
Single family dwellings	270 two-story with basement units, average structure area of 1,200 square foot, including paving, utilities and landscaping
Townhouses	180 multi-family units
Apartments	270 multi-family units
Permanent mobile homes	90 units (Land subdivision only, workers supply own mobile homes)
Temporary mobile homes	1,210 units (land subdivision only, workers supply own mobile homes)
Temporary rental	300 units (standard dormitory units)
Commercial Development	
Community shopping center and convenience center	20,000 square foot sales area, 4,000 square foot common area, including equipment and furnishing 50,000 square foot parking and circulation Utility connections

Source: IPP, 1977.

TABLE 1-14

Annual Peak Employment by Year
(Construction)

Year	Number Employed: Plant Complex	Coal Transportation (Railroad)	Communication Sites and Transmission Line
1981	60	0	0
1982	100	20	130
1983	750	430	941
1984	1,700	430	984
1985	2,500	285	326
1986	2,520	30	525
1987	2,230	0	230
1988	1,690	0	123
1989	790	0	

Source: IPP, 1978.

TABLE 1-15

Annual Peak Employment by Year
(Operations)

Year	Number Employed			
	Plant Complex	Coal Transportation (Railroad)	Transmission Line	Communication Sites & Substation
1985	100	20		
1986	255	30		
1987	300	40		
1988	440	50		
1989	550	60	4	39
1990	550	60	4	39

Source: IPP, 1978.

These camps would consist of graded areas equipped with laundry, bath houses, and sewage treatment facilities. The need for these camps could arise during construction of the line from the Loa-Bicknell area to the Panaca-Pioche region. It is expected that each site would be on land leased from private landholders.

Construction forces for the Victorville converter station, as well as most of the 39 employees associated with the operation and maintenance of the converter station, would reside in Victorville, California.

d. Lime Supply and Transportation System

The United States Lime Division of the Flintkote Company would supply lime for the project from its present facilities near the town of Grantsville, Utah. Flintkote would require between 12 and 14 additional employees to mine, process, and deliver the project's needs. The additional plant and trucking personnel would come from the relatively large local labor pool in the Salt Lake City area.

9. Environmental Monitoring

a. Meteorological Monitoring

IPP proposes to continually monitor meteorological conditions near the plant site using an existing 100 meter meteorological tower on Factory Bench. This station measures horizontal wind speed and direction, humidity, and temperature at the 10 meter and 100 meter levels. Precipitation and evaporation are also recorded at this site. This station would provide baseline atmospheric data.

b. Stack Emission Monitoring

A flue gas monitoring system would continuously sample plant stack emissions. Monitoring instruments would be capable of recording SO_2, NO_2, oxygen (O_2) concentrations, and opacity. Opacity measurements would aid in determining the visibility of stack emissions. O_2 measurements would provide a mechanism for controlling boiler firing and combustion temperature. An off-site air quality monitoring system would measure ambient air quality.

The monitoring system would collect air quality data to be used to simulate the plant's effect on ambient air quality and would also provide advance warnings of air quality problems.

To ascertain the accuracy of air quality predictions, six continuous ambient SO_2 monitoring stations would be located near the plant. Special attention would be given to locating the monitoring stations at critical terrain points which show a potential for high SO_2 concentrations.

Information from the SO_2 monitoring stations, the meteorological tower, and the plant emission and load monitors would be relayed to a central station at frequent intervals. The meteorological and emission forecasts would be used in an air quality model to calculate expected future concentrations of SO_2 in the plant vicinity.

c. Water Quality Monitoring

Water quality for plant use would be monitored for both the ground water and surface water supply systems throughout the operational period of the project.

d. Terrestrial Monitoring

The applicant has conducted terrestrial trace element studies to obtain baseline data at the location of the proposed power generating site. Beginning in the fall of 1974, soil, vegetation, and animal samples were collected and analyzed for over 30 trace elements.

10. Decommissioning

The continued operation of any or all parts of the project at the end of its estimated 35-year life would depend upon the needs of the participants, the relationship to other available energy sources, environmental impacts, economics, and technical viability at that time.

Because the known coal reserves in the region far exceed those needed during the estimated life of the project, the assumption is that the project facilities would be maintained, repaired, or replaced to extend the overall useful life beyond the 35 years.

As any or all of the project systems could reach a point where they would no longer serve a useful purpose for IPP or other related projects, the facilities would be abandoned or removed in accordance with the laws and regulations existing at that time. Restoration of disturbed areas would also be done in coordination with governmental agencies.

At this time, disposition of the power transmission systems at the conclusion of the project cannot be determined with any certainty. With the exception of the tower footings, which would not likely be removed, the transmission lines could be dismantled, if no longer in service, and the land permitted to return to its previous condition.

G. APPLICANT PROPOSED DESIGN FEATURES AND GOVERNMENT AGENCY STANDARD REQUIREMENTS

Project design features proposed by the applicant and standard requirements by federal, state, and local governments could reduce or eliminate impacts to the human environment. These project features and requirements are listed below:

1. Applicant Proposed Design Features

a. IPP would blend coal to achieve the required sulfur and ash content.

b. Coal dust would be controlled by:

(1) Covering conveyors.

(2) Spraying coal with water wherever coal is spilled or transferred, except at the coal silo.

(3) Constructing earth berms, the same height as the active storage piles, to protect the piles from wind.

(4) Spraying the reserve coal storage piles with a surface crusting agent.

c. Remedial action would be taken as necessary to suppress any fugitive dust that may result from ash handling transportation and disposal. Ash hauled to the disposal site would be covered with top soil and the site would be revegetated, if feasible, as the fill progresses.

d. Material borrow areas would be restored when possible to blend with adjacent terrain.

e. The bottoms of the evaporation ponds would be lined to protect all surface and ground water bodies from pond seepage.

f. The sanitary treatment lagoon would be lined so as to prevent percolation to underlying soil formations.

g. During the operating lifetime of the plant, 250 acre-feet of water per year would be supplied to meet terrestrial ecological needs at Caine Spring.

h. Reliable irrigation water would be available for local agricultural purposes from the Red Desert Reservoir.

i. The Red Desert Reservoir would be made available for public recreation use to the extent such use is compatible with project use of the reservoir.

j. Along transmission lines, removal of trees would be limited to those closer than 20 feet to an electrical power conductor. Whenever possible, clearing of trees creating a hazard would be done after conductor installation to minimize tree removal.

k. The carrying of firearms by employees while on the job or in company-owned vehicles would be prohibited except for security guards.

l. The railroad track would be constructed with a low profile in order to minimize the visual impact.

m. IPP would coordinate with regional, county, and local officials in planning and scheduling development and construction.

n. Construction camps would be established where the available community facilities cannot accommodate the construction work force.

o. Appropriate road signs for public safety purposes would be provided during construction, such as "Caution Heavy Truck Traffic" or "Be Prepared to Stop," where considered necessary.

Flagmen, barricades, and other safety measures would be provided as required to ensure public safety.

p. A landscape architect employed by the appropriate public land management agency would be consulted prior to construction on respective lands to select colors which help blend structures with that of the natural landscape.

2. Measures Required of the Applicant By Federal Agencies

The Federal Government has mandates to protect: threatened and endangered species and their critical habitat; historical, archaeological and paleontological resources; and wild horses and burros. Also, there are mandates to protect areas currently being managed to protect their potential for classification as wilderness areas. Other areas having special designation must also be protected. It is also assumed that sufficient funding and manpower would be available to properly enforce the required mitigating measures herein.

Authority for mitigation of loss of vegetation, livestock forage, wildlife habitat, archaeological and paleontological values, and a reduction in water and air quality, aesthetics, and recreation on federal lands, is granted under the following acts.

Organic Administration Act of 1897
Reclamation Act of 1902
Preservation of American Antiquities Act of 1906
Wilderness Act of 1964
Historic Preservation Act of 1966
Executive Order 11593 of 1971 (Protection and Enhancement of the Cultural Environment)
Archeological and Historical Data Preservation Act of 1974
Federal Land Policy and Management Act of 1976
The Clean Air Act as Amended 1977
The Federal Clean Water Act of 1977
Endangered Species Act as Amended 1978
Executive Order 12088

Federal regulatory agencies would also require compliance with safety and noise level regulations imposed by the Occupational Safety and Health Act of 1970; with the Federal Aviation Administration clearance standards, granted under authority of the Federal Aviation Act of 1958; and with grounding and clearance requirements of the National Electric Safety Code.

All mitigating measures outlined here could be modified as deemed necessary within authorized limits by the appropriate federal offical.

If the proposed project were approved, the applicant would be required to carry out the following measures on lands administered by Bureau of Land Management (BLM), U.S. Forest Service (USFS), and Bureau of Reclamation (USBR):

a. A plan of operation would be prepared covering the construction of all project facilities in cooperation with the appropriate federal agencies. The applicant would provide funding to the appropriate federal agencies for administration of construction activities.

b. All existing improvements along transmission systems would be protected and damage would be repaired.

c. All public land survey monuments, private property corners, and forest boundary monuments would be located, marked, and protected in place. In the event of destruction, they would be replaced.

d. Clearing would be restricted to the minimum necessary.

e. Scalping of top soil would not be permitted along the transmission line. Dozer, blade, or ripper-equipped tracked vehicles would not be allowed except for access road construction.

f. The BLM has determined that the proposed action may have an effect on an officially listed endangered species. In compliance with Section 402.04 of the regulations, formal consultation with the U.S. Fish and Wildlife Service has been initiated, but a biological opinion has not yet been received. Until the biological opinion is issued, the BLM will not take any action which would make an irreversible or irretrievable commitment of resources which would foreclose the consideration of modifications or alternatives to the proposed action. Should the biological opinion indicate that the proposed action would likely jeopardize the continued existance of an officially listed species or result in the destruction or adverse modification of critical habitat, the proposed action would be abandoned or altered as necessary. These procedures are in compliance with BLM Manual Section 6840.

g. The applicant would provide funding for a botanist approved by the appropriate federal official, to survey for candidate, proposed, and officially listed threatened and endangered flora. The botanist would intensively survey all areas to be disturbed and designate those areas in which no disturbance would be permitted. The botanist would be available, as needed, during surface disturbance.

h. Any construction or disturbance that would impair wilderness character and therefore wilderness suitability within a USFS Roadless Area Review and Evaluation Area (RARE II) or a BLM Wilderness Study Area (WSA) would not be allowed prior to congressional decision. Any construction or disturbance that would impair wilderness character and therefore wilderness suitability within a BLM uninventoried roadless area would not be allowed prior to completion of BLM's wilderness review.

i. Water bars would be constructed on permanent access roads to adequately divert runoff to natural drainages. Location of water bars would be determined by the appropriate federal official. Roadside drainage ditches would be constructed on access roads to reduce water flow and velocity. Drain ditches would be dug at intervals determined by the federal authorizing officer. Roads would be "out-sloped" as much as possible. Berms would be removed.

j. All rivers, streams, and washes would be crossed at existing roads or bridges, except at locations designated by the appropriate federal official. The applicant would be required to install culverts or bridges at points where new permanent access roads would cross live streams. Where streams are crossed by temporary roads, dirt fills or culverts would be placed and removed upon completion of the project. Any construction activity in a perennial stream would be prohibited unless specifically allowed by the appropriate federal official. All stream channels and washes would be returned to their natural state.

k. Vegetation which has been cleared due to construction or other activity associated with this project would be re-established (to the extent practical) where designated by the appropriate federal official. Vegetation cleared during construction would be shredded and left as mulch.

l. The applicant would prepare a screening plan to minimize visual impacts from structures. The plan must be submited in writing to the appropriate federal official, to obtain approval before starting construction.

m. All trash, packing material, and other refuse would be removed from construction areas on federal land and placed in approved sanitary landfills.

n. Nonspecular conductors and compatible insulators would be installed on all transmission line systems.

o. All access roads on federal lands blocked as the result of construction of project components would be rerouted or rebuilt. Cattle guards or gates would be provided along the new access roads as directed by the appropriate federal official.

p. Intensive archaeological surveys and clearance would be required for all project sites (as specified in BLM Manual 8111.14) prior to new construction. Properties eligible for inclusion in the National Register of Historic Places would be identified in consultation with the appropriate State Historic Preservation Officer as specified in 36 CFR 800.4 and 36 CFR 63. Wherever possible, sites would be avoided. Where avoidance is not possible, mitigation of adverse effects to sites eligible for the National Register would be undertaken in compliance with 36 CFR 800. Sites discovered during construction or other activities authorized by BLM would be evaluated and managed as specified in 36 CFR 800. Memorandums of Understanding with the Utah, Nevada, California, and Arizona State Historic Preservation Officers regarding protection of cultural resources are presented in Chapter 9. The enclosed Memorandums of Understanding do not represent compliance with Section 106 of the National Historic Preservation Act but guarantee this compliance at the appropiate stages of project planning.

q. The applicant would provide funding for a qualified paleontologist who would be approved by the appropriate federal official. The paleontologist would conduct an intensive survey of all areas to be disturbed which are identified by the appropriate federal official as having high potential for paleontological resources. An approved paleontologist would be available, as needed, during surface disturbance. If the paleontologist determines that paleontological values would be disturbed, construction would be halted until appropriate action could be taken.

r. In cooperation with the appropriate federal official, a fire control plan would be prepared. Internal combustion engines would be equipped with approved exhaust mufflers or spark arrestors.

s. Travel would be restricted to right-of-way and existing public roads. Cross-country motor vehicle travel would be prohibited.

t. All low voltage power transmission lines would be designed to prevent electrocution of raptors.

u. Transmission line construction would not be allowed when in conflict with existing mining and drilling operations.

3. Measures required of the Applicant By State and Local Entities

a. The same mitigating measures could be required on state and local government lands as on federal land. Authority is granted in the State of Utah under the Utah Code Annotated (UCA) 1953, 65-2-1 and authority is granted under the California Environmental Quality Act in the State of California.

b. The various states would require the same mitigating measures as required on federal lands for cultural resources.

H. INTERRELATIONSHIPS WITH OTHER PROJECTS AND PROPOSALS

1. Electric Generating Facilities

During the past two decades, five coal-fired generating stations have been constructed within a region encompassing northwestern New Mexico, northern Arizona, and central Utah. In addition, the Hunter plant (Emery), a coal-fired generating complex located near Castle Dale, Utah is currently under construction. One 430 MW unit began commercial operation in 1978. Figure 1-24 shows the location of IPP interrelated generating facilities.

The Warner Valley coal-fired generating complex is proposed on a site located about 13 miles southeast of St. George, Utah, and the Allen generating complex is proposed for a site about 10 miles north of Las Vegas. The proponents of the Allen and Warner Valley stations would deliver electricity to their service areas in Utah, Nevada, and southern California. The first Warner Valley generating unit could be operational by 1985 and the first Allen unit by 1986.

INTERRELATED GENERATING STATIONS

FIGURE 1-24

Table 1-16 lists the interrelationships between IPP and other coal-fired generating complexes.

2. Coal

Environment Statement: Development of Coal Resources in Central Utah

This environmental statement, prepared by an interagency task force under the leadership of the USGS, analyzes the projected coal and energy development, through 1990, in the same geographic area covered within this statement. The analysis includes the projected coal needs for IPP. The final environmental statement was published in June of 1979.

Mineral Development

During 1977, total coal production in Carbon and Emery counties was approximately 8,000,000 tons. Expansion of production, related to the proposed project and other opportunities in Carbon and Emery counties, is expected to increase coal production to 24,000,000 tons by 1990. Mining personnel are expected to increase from the 1,607 in 1974 to 6,960 by 1990 (USGS, 1978). Figure 1-25 shows the location of the 21 producing mines and seven interrelated new, probable coal mines. Site specific and cumulative effects of projected mine developments are analyzed in the Environmental Statement: Development of Coal Resources in Central Utah.

3. Land Use Planning

Governmental entities having responsibilities for lands affected by the proposed project have been engaged in some form of land use planning for several years. Conflicts with BLM's Management Framework Plans, the Forest Service's Multiple Use, Land Use, and Land Management plans, and local government's "Master Plans" and zoning regulations are considered within chapters 3, 4, 5, and 8 of this document.

4. Transmission Systems

Figure 1-26 shows the portions of the proposed IPP transmission system that would parallel existing power transmission lines. The following describes the existing and proposed lines that would be paralleled by the segments designated in Figures 1-26:

1. Two 500-kV d.c. lines and one 345-kV a.c. line would parallel existing single Utah Power and Light 230-kV a.c. lines.

2.a One 230-kV a.c. line would parallel an existing Nevada Power 69-kV a.c. distribution line.

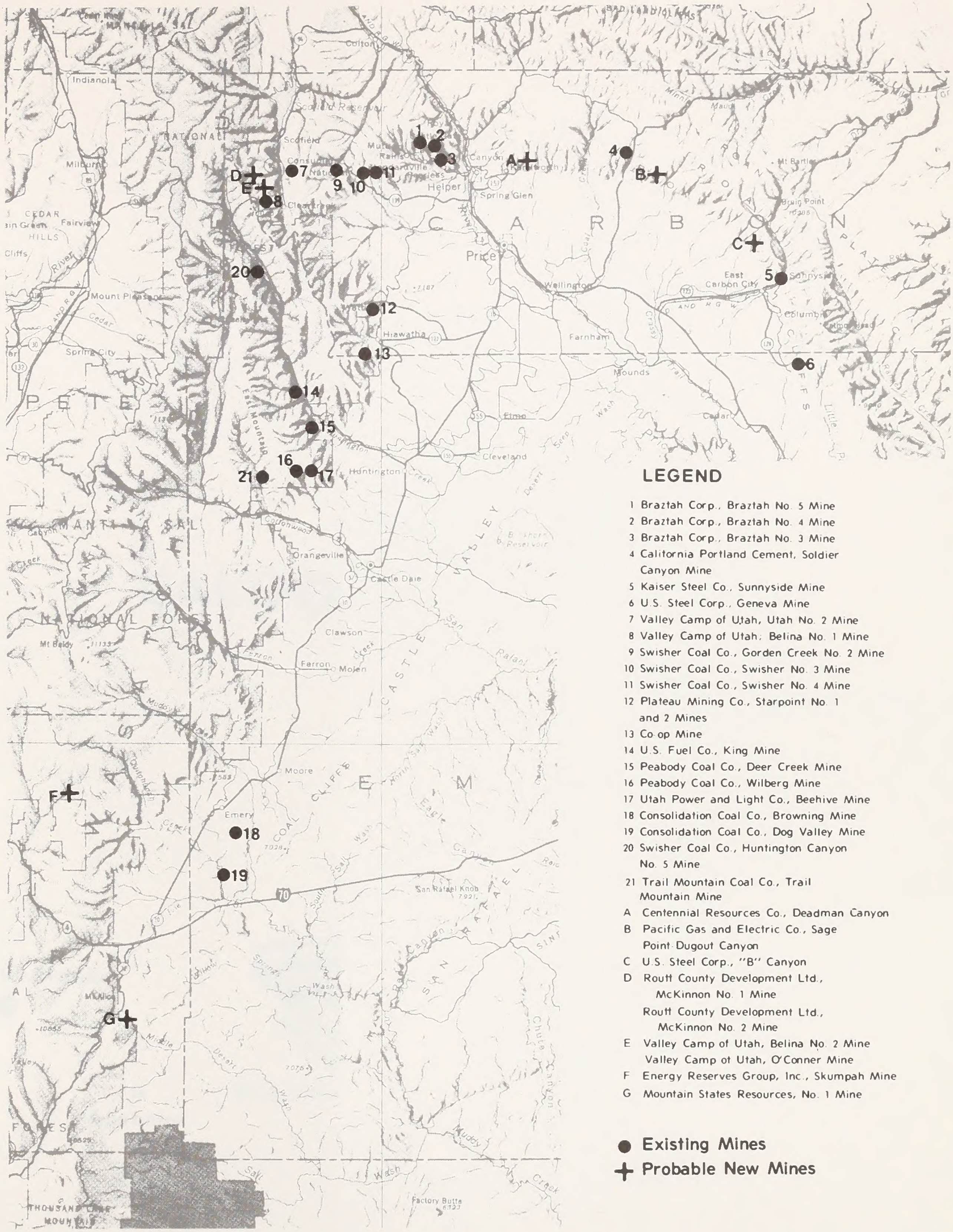
2.b One 500-kV d.c. line would parallel an existing Nevada Power 69-kV a.c. distribution line.

3. One 500-kV d.c. would parallel an existing 500-kV a.c. (Navajo-McCullough) line. A 500-kV a.c. line is proposed for this section by the Warner Valley project.

TABLE 1-16

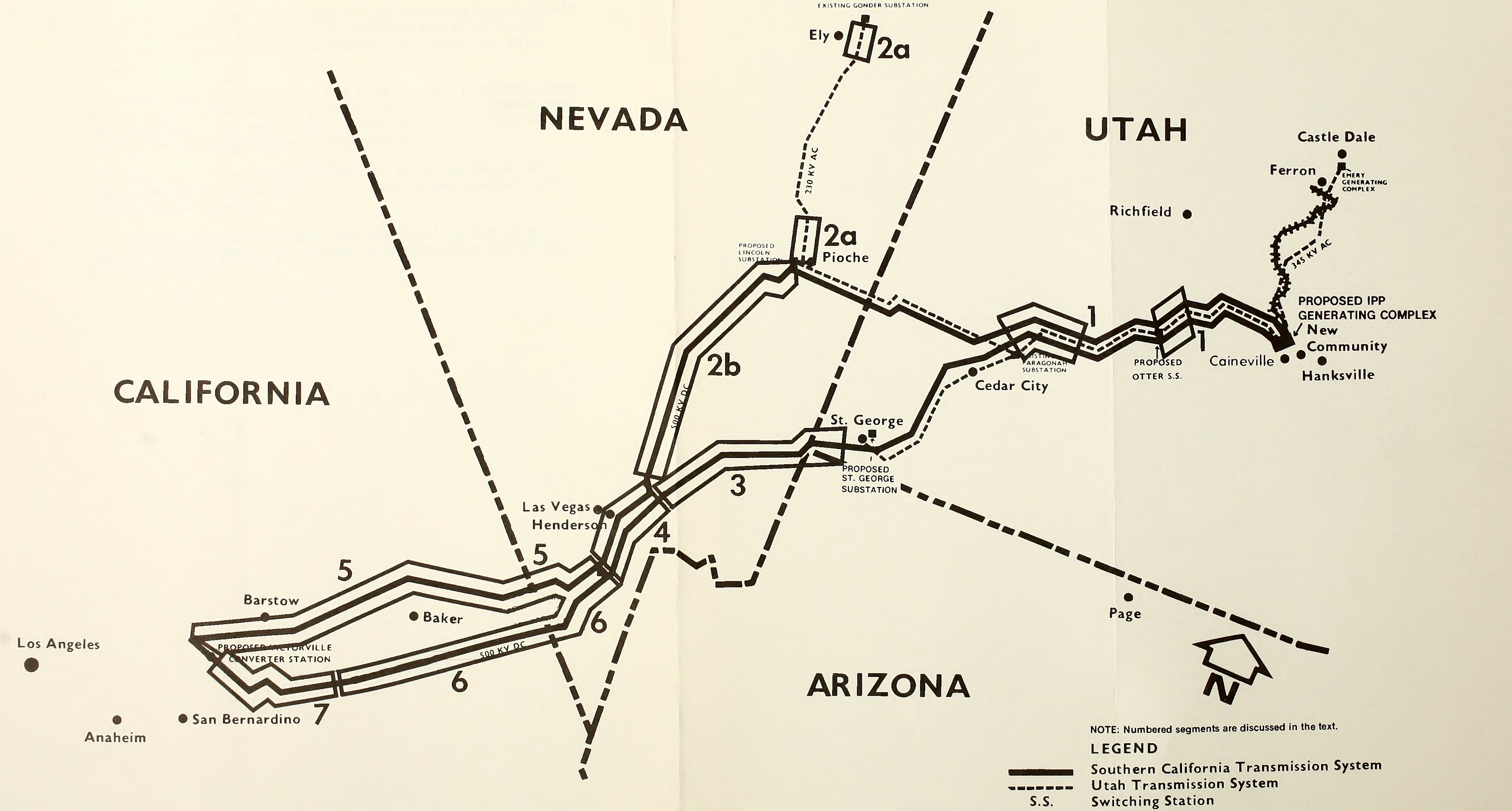
Coal-Fired Generating Complexes Interrelated With IPP Complex

Development	Percent Owned	Location	Size (no. units)(MW)	Date of Beginning Operation	Possible Interrelationships
Carbon		3 mi NW of Helper, Utah	1 - 100	1957	Air Quality
Utah Power & Light	100		1 - 60	1954	Socioeconomic
San Juan		About 13 mi N of Four Corners	1 - 330	1973	Air Quality
Public Service Co. of NM	50	power plant	1 - 330	1975	
Tucson Gas & Electric	50				
Four Corners		NW Corner of New Mexico, near	1 - 176	1963	Air Quality
Arizona Public Service	15	Shiprock	1 - 177	1963	
El Paso Natural Gas	7		1 - 220	1964	
Public Service Co. of NM	13		1 - 800	1969	
Salt River Project	10		1 - 800	1970	
Southern California Edison	48				
Tucson Gas & Electric	7				
Huntington		9 mi W of Huntington, Utah	1 - 430	1974	Air Quality
Utah Power & Light	100		1 - 430	1977	Socioeconomic
Navajo		4 mi E of Page, Arizona	1 - 750	1974	Air Quality
Salt River Project	21.7		1 - 750	1975	Segments of Navajo-
Los Angeles Dept of Water &			1 - 750	1976	McCullough trans-
Power	21.2				mission line would
Arizona Public Service Co	14.0				be paralleled by
Nevada Power Co	11.3				proposed IPP
Tucson Gas & Electric	7.5				transmission lines.
Bureau of Reclamation (US)	24.3				
Hunter (Emery)					
Utah Power & Light	100	3 mi S of Castle Dale, Utah	1 - 430	1978	Air Quality
			1 - 430	1979	Socioeconomic
			1 - 430	1983	Segments of UP&L
			1 - 430	1985	transmission lines
					would be paralleled
					by proposed IPP
					transmission lines.
Allen-Warner Valley Project					
Warner Plant		13 mi SE of St. George, Utah	1 - 250	1985	Common transmission
Nevada Power Company	80		1 - 250	1986	route, Cedar Wash
Southern California Edison					So. Eldorado Jct.
Pacific Gas and Electric					
City of St. George					
Harry Allen Station		25 mi NE Las Vegas, Nevada	1 - 500	1986	(Portions of
Nevada Power	20		1 - 500	1987	Navajo-McCullough
So. California Edison			1 - 500	1988	route and La DWP
Pacific Gas and Electric			1 - 500	1989	route #1.



INTERRELATED COAL MINING

FIGURE 1-25



INTERRELATIONSHIPS OF THE PROPOSED INTERMOUNTAIN POWER PROJECT TRANSMISSION LINE CORRIDORS

FIGURE 1-26

4. Two 500-kV d.c. lines would parallel the existing Navajo-McCullough (one 500-kV a.c.) line. In addition the Allen-Warner Valley project has proposed two 500-kV a.c. lines for this segment.

5. One 500-kV d.c. would parallel two existing 287.5-kV a.c. lines and one existing 500-kV a.c. line in the Los Angeles Water and Power corridor. Two 500-kV a.c. lines are proposed for this corridor by the Allen-Warner Valley project.

6. One 500-kV d.c. line would parallel two existing 220-kV a.c. lines, and one existing 500-kV a.c. line in the Southern California Edison Corridor.

7. One 500-kV d.c. line would parallel two existing 220-kV a.c. and two existing 500-kV a.c. lines in the Southern California Edison Corridor.

E. GOVERNMENT ACTIONS REQUIRED TO AUTHORIZE THE PROJECT

This section describes actions required by federal agencies, states, and local authorities.

1. Federal Actions

Table 1-17 is a summary of the authorizing actions required for the project showing Federal agency involved, the project feature, the magnitude, and the legal authority directing the action:

TABLE 1-17

Federal Authorizing Actions

Project Feature	Magnitude	Authorizing Actions	Authority
	DEPARTMENT OF THE INTERIOR Bureau of Land Management		
Generating Station and Support Facilities	4,640 acres	Transfer ownership (Land Sale)[a]	Title II of Federal Land Policy and Management Act of 1976 (90 Stat. 2750, et seq.) Section 203
Hard surfaced access road extending from Utah Highway 24 and proposed Red Desert complex; also buried water pipe lines and overhead power distribution lines; also secondary access road to power plant	Common transportation utility corridor. Length: About 10 miles Width: 80-100 feet Also 7 miles of secondary access road Width: 80 feet	Grant right-of-way	Title V of Federal Land Policy and Management Act of 1976 (90 Stat. 2776, et seq.)
Construction materials for roads, power plant complex, water diversion works and miscellaneous.	Eight borrow areas (gravel, sand, etc.)	Issue permit for borrow material	Act of July 31, 1947 as amended (30 U.S.C. 601, 602, 43 CFR Part 3600)
Ground Water System			
Wayne-Emery-Garfield Counties, Utah 15 production wells 15 observation wells	Each well site would occupy 100 x 200 square feet; however, about 45,000 acres of public lands are included in well field investigations	Grant right-of-way	Title V of Federal Land Policy and Management Act of 1976 (90 Stat. 2776, et. seq.)
15 kV power lines to individual water pumps; water pipe lines from source to power generating complex and access roads	Common corridor Length: About 71 miles Width: 100 feet	Grant right-of-way	Title V of Federal Land Policy and Management Act of 1976 (90 Stat. 2776, et seq.)
Red Desert Dam Storage Reservoir, also pumping plant and access roads	About 3,360 acres total; 1,000 inundated at maximum storage capacity; with adjacent pumping plant, access road	Grant right-of-way	Title V of Federal Land Policy and Management Act of 1976 (90 Stat. 2776, et seq.)

TABLE 1-17 (continued)

Project Feature	Magnitude	Authorizing Actions	Authority
Construction materials for Red Desert Dam	2.6 million cubic yards of earth dam construction materials. Obtained from 3 sites.	Issue Permit for mineral materials	Act of July 31, 1947, as amended (30 U.S.C. 601, 602, 43 CFR Part 3600)
Coal Haul Railroad			
Single track; would transport coal from source to power generating complex	Total length 63.4 miles about 37 miles would cross public land with a 100 foot wide right-of-way	Grant right-of-way	Title V of Federal Land Policy and Management Act of 1976 (90 Stat. 2776, et seq.)
Moroni Slopes Microwave Communication Station with power lines and access road	About 4 acres including 2 miles of access road and power distribution line	Grant right-of-way	Title V of Federal Land Policy and Management Act of 1976 (90 Stat. 2776, et seq.)
Existing meteorological tower with electrical power extension and vehicular access	600 X 600 feet area; about 500 feet of access road and 7,500 feet of power line	Issue Special Land-Use Permit	43 C.F.R. 2920.0-3
Rock crushing and screening plant	40 acres	Issue Temporary Use Permit	Title V of Federal Land Policy and Management Act of 1976 (90 Stat. 2778 et seq.)
Existing ground water test wells and access road	Two observation pump wells, each site covering about 2 acres; about 2 miles of access road	Issue Special Land-Use Permit	43 C.F.R. 2920.0-3
Technical site investigations (power generating complex; dam sites; borrow areas)	Preliminary investigation included about 10,000 acres of public lands	Issue Special Land-Use Permit	43 C.F.R. 2920.0-3
<u>Power Transmission Systems</u>			
Southern California System: Two 500-kV d.c. electrical power transmission lines would extend from the power generating complex in Wayne, County, Utah to a converter station near Victorville, California.	About 705 miles of of varying width right-of-way would cross public lands situated in Utah, Arizona, Nevada and California.	Grant right-of-way[a]	Title V of Federal Land Policy and Management Act of 1976 (90 Stat. 2776, et seq.)
Utah Transmission System: This system would have 345 kV and 230 kV facilities required to transmit 450 MW to the Intermountain Consumer Power Association participants	About 289 miles of new right-of-way would extend across public lands in Utah and eastern Nevada. One hundred and forty of the 289 miles would occupy common corridors with the Southern California power lines.	Grant right-of-way[a]	Title V of Federal Land Policy and Management Act of 1976 (90 Stat. 2776, et seq.)
Field Offices and Other construction yards.	About 25 miles apart along route.	Temporary Use Permit	Federal Land Policy and Management Act of 1976 (90 Stat. 2778)

TABLE 1-17 (continued)

Project Feature	Magnitude	Authorizing Actions	Authority
New Town			
Factory Bench Site	1,080 acres public land	Transfer ownership[a] (Land Sale)	Federal Land Policy and Management Act of 1976 (PL 94-579)
Power transmission lines	Approximately 5 miles of route would cross Reclamation withdrawn land in Nevada	Issue license	Act of June 17, 1902, 32 Stat 388 as amended and supplemented
	DEPARTMENT OF AGRICULTURE U.S. Forest Service (Fishlake N.F.)		
Ground Water System			
1 production and 1 observation well, also 5 miles of common corridor for access road, power line, and pipeline	Each well site would occupy 100 x 200 sq. feet; however, 2,880 acres National Forest Land are included in well field.	Grant Special Use Permit	Title V of Federal Land Policy and Management Act of 1976 (90 Stat. 2776 et seq.)
Microwave Stations			
Elkhorn Site with electronic facilities, power source and access road.	Site would occupy 50 x 50 square feet, also needed are 13 miles of underground power distribution line and 1/2 mile of access road.	Grant Special Use Permit	Title V of Federal Land Policy and Management Act of 1976 (90 Stat. 2776)
Monroe Peak Site	Facilities would occupy 50 x 50 square feet on designated communication site; power would be available from an underground extension from existing junction box. Existing access roads would be used.	Grant Special Use Permit	Title V of Federal Land and Management Act of 1976 (90 Stat. 2776)
Southern California and Utah Transmission Systems:			
Two 500-kV d.c. electrical power transmission lines within the Salt Wash to Jack Henry Junction segment, also access roads for construction and maintenance of power line. One 345 kV a.c. electrical power transmission line within the Salt Wash to Jack Henry Junction segment.	Power transmission lines would cross approximately 19 miles in common corridor within Fishlake National Forest	Grant right-of-way[a] Permit	Federal Land Policy and Management Act of 1976 (90 Stat. 2776)

TABLE 1-17 (concluded)

Project Feature	Magnitude	Authorizing Actions	Authority
		(Dixie N.F.)	
Microwave Station			
Barney Top Site	Same as Monroe Peak Site	Grant Special Use Permit	Title V of Federal Land Policy and Management Act of 1976 (90 Stat. 2776)
		RURAL ELECTRIFICATION ADMINISTRATION	
Intermountain Power Project	3,000 MW coal-fired generating station and ancillary features.	Approve participation of Rural Electric Cooperatives in Project.	Rural Electrification Act of 1936, 49 Stat. 1363, 7 U.S.C. Chap. 31; 7 U.S.C. 901-950 (6)
		FEDERAL ENERGY REGULATORY COMMISSION	
Intermountain Power Project	3,000 MW coal fired generating station and ancillary features.	Approve participation of UP&L in project.	Federal Power Act of 1970, as amended.
		DEPARTMENT OF DEFENSE Army Corp of Engineers	
Fremont River Diversion and pipeline with pumping plant and access roads. Stream crossings with power transmission line and railroads.	Proposed facilities would divert all surface water from Fremont River during non-irrigation seasons into Red Desert Storage Reservoir. Pipe lines would cross streams, in addition, power lines and access roads would cross four states.	Grant permits for placement of structures and fill in navigable waters.	Federal Clean Water Act of 1977 (33 USC, 1251)
		FEDERAL COMMUNICATION COMMISSION	
Microwave Communcation Stations	Four new microwave stations would be constructed in Utah. IPP would also utilize existing microwave stations (16) extending from Navajo Power Plant to Los Angeles, California.	Grant license to construct new and continued utilization of existing stations.	Act of June 19, 1934 as amended; 48 Stat. 1082; 47 U.S.C. 303, 47 CFR 1.70.
		DEPARTMENT OF TRANSPORTATION Federal Aviation Agency	
Concrete Chimneys (Stacks)	Two stacks 750 feet tall would be constructed within power generating complex. Might affect navigable air space	Issue Air Space Permit	Federal Aviation Act of 1958, Public Law 850746, August 23, 1952, 72 Stat. 749; 797, 49 U.S.C. 1347, 1501; 14 CFR Part 77.
		ENVIRONMENTAL PROTECTION AGENCY	
Power generating complex and ancillary features	Construction of 3,000 MW power generating plant; water storage facilities; transmission line in 1,054 miles of power transmission line corridors; access roads; development of material sites, and other project component.	Issue a construction permit	Clean Air Act Compliance with the Prevention of Significant Deterioration Regulation (40 CFR 42.21).

[a]Appendix I-9 gives further details on federal authorizing actions.

2. State Actions

Table 1-18 is a summary of authorizing actions which the State of Utah would have to undertake in order for the proposal to proceed.

TABLE 1-18

State Authorizing Actions

Project Feature	Magnitude	Authorizing Actions	Authority
		STATE OF UTAH	
		Public Service Commission	
Intermountain Power Project	3000 MW coal-fired generating station and ancillary features.	Approve participation of UP&L in project.	Utah Code Annotated 1953 Title 54.
		Department of Transportation	
Power transmission lines	Seventeen crossings over state highway or Federal system roads by power transmission lines.	Issue Encroachment Permit.	Utah Code Annotated 1953 as amended 27-9-9 through 11.
		Division of Water Rights	
Ground water sources	Approximately 20,000 acre-feet of water per year would be pumped from ground water	Approve Water Appropriation applications filed by proponents of Intermountain Power Project.	Utah Code Annotated 73-3-1, 73-3-2, 73-3-8.
		Division of Health Branch of Environmental Services	
Each project component related to pollution production and control	Power generating complex, and ancillary features (boilers, precipitator, scrubbers, etc.	Issue permit	Utah Code Annotated 1953, as amended chapter 24-26.
Solid waste disposal plans	All solid waste related to proposed power plant	Approval of plans.	Utah Code Annotated as amended Title 26.
Culinary water source and treatment plant.	Domestic water supply	Issue permits	UCA - 1953 Sec. 26-15-4
		Utah State Division of Lands	
Fremont River diversion dam, pumping station, power lines, pipelines and access roads (Sec. 16, T 29 S. R 8 E. SLB&M)	Construction of dam and diversion works would create 200 acre feet regulatory pool from which water could be pumped via pipeline into proposed Red Desert Reservoir.	Grant Right-of-Way	Utah Code Annotated 1953, as amended 65-2-1

TABLE 1-18 (concluded)

Project Feature	Magnitude	Authorizing Actions	Authority
Ground water system Production and observation wells; 7 miles of common corridor for pipeline, power line, and access road (80 ft. wide)	Three production wells, also 3 observation wells would each occupy 100 x 200 sq. ft; however, 6,400 acres of state owned land are included in well field investigations.	Grant right-of-way way	Utah Code Annotated 1953, as amended 65-2-1
Overhead power lines (15-kV) to individual water pumps, pipelines from water source to connect into underground conveyance system, also access roads to wells.	Common corridor approx. length: 5 miles width : 80 feet	Grant right-of-way	Utah Code Annoted 1953, as amended 65-2-1.
Segment of primary access extending from Utah Highway 24 to power generating complex. R/W would also include 2 pipelines and 2 overhead power transmission lines.	Common corridor approx. 3/4 mile long; 100 . feet wide.	Grant right-of-way	Utah Code Annotated 1953, as amended 65-2-1
Secondary access road from plant site to Factory Bench	One mile long and 100 feet wide	Grant right-of-way	Utah Code Annotated 1953, as amended 65-2-1
Coal haul railroad extending from coal source in Emery County, Utah to power generating complex	Approximately 5 miles of State owned land would be crossed by railroad 100' wide	Grant right-of-way	Utah Code Annotated 1953, as amended 65-2-1
<u>Power Transmission Routes</u>			
Southern California System	Approximately 27 miles of power lines would cross state owned land in Utah. R/W widths would vary by segments of power line route. Access roads would also be needed.	Grant right-of-way	Utah Code Annotated 1953, as amended 65-2-1
Utah System	Approximately 33 miles of power lines would cross state land; 23 of which are within common corridors in the Southern California Transmission System; width would vary, access roads also needed.	Grant right-of-way	Utah Code Annotated 1953, as ammended 65-2-1
	STATE OF NEVADA		
	Division of Colorado River Resources Eldorado Valley Commission		
Southern California System	Approximately 15 miles of 500-kV line would cross Eldorado Valley, Nevada.	Endorse proposed transmission route	State of Nevada Eldorado Act

3. Local Actions

Table 1-19 is a summary of actions by local governmental entities which would be required to implement the proposal.

TABLE 1-19

Local Authorizing Actions

Project Feature	Magnitude	Authorizing Actions	Authority
		UTAH	
		Wayne County	
Power plant and ancillary facilities	Approximatley 13,000 acres of right-of-way requests.	Zoning Variance	County Master Plan, October 1976.
New Town	1,080 acres	Zoning Variance	County Master Plan October 1976.
		ARIZONA	
		Mohave County	
		County Commissioner (County Planning Commission)	
Power Transmission Line Southern California System	One transmission line 500-kV 10 miles long	Grant Construction Permit	Mohave County Zoning Ordinance.
		NEVADA	
		Clark County Commission	
Southern California System	Two 500-kV d.c. power lines, 215 miles long	Grant Use Permit	Various county regulations
		Road Department	
Southern California System	Several road crossings	Issue Encroachment Permit before transmission lines are constructed across county or municipal roads.	Various county regulations
		STATE OF CALIFORNIA	
		California Municipal Utilities	
Intermountain Power Project	3,000 MW coal-fired generating station and ancillary features.	Certify IPP Environmental Impact Report and approve participation in project.	California Environmental Quality Act of 1970, as amended.

CHAPTER 2

DESCRIPTION OF THE ENVIRONMENT

CHAPTER 2
DESCRIPTION OF THE ENVIRONMENT

A. INTRODUCTION

This chapter describes the elements of the environment likely to be affected by the proposed project. The future environment without the proposed project is described in a second section. Thirty-five years beyond the completion date of the proposed project is used as a point of reference. Estimates are based upon trends in population, existing economy, regional development plans, and uses of resources.

A primary project area has been defined, as depicted on Figure 2-1, in order to provide focus for the direct effects of the generating station and ancillary facilities including water wells and pipelines. The eastern boundary of Capitol Reef National Park was used as the western border of the primary project area because the proposed well field parallels this boundary. No facilites would be placed within the park. Figure 2-2 delineates a regional setting throughout which travel related and secondary effects could be expected.

"Environmental Profiles" are cross-sectional representations which show the salient features of the environments through which the project's linear components would pass. The environmental profiles, Figures 2-A through 2-M, are found at the end of this chapter.

B. CLIMATE AND AIR QUALITY

Figure 2-3 shows areas of air quality concern for the proposed IPP and the locations of other energy conversion processes (Regional Air Quality Study, ERT 1977).

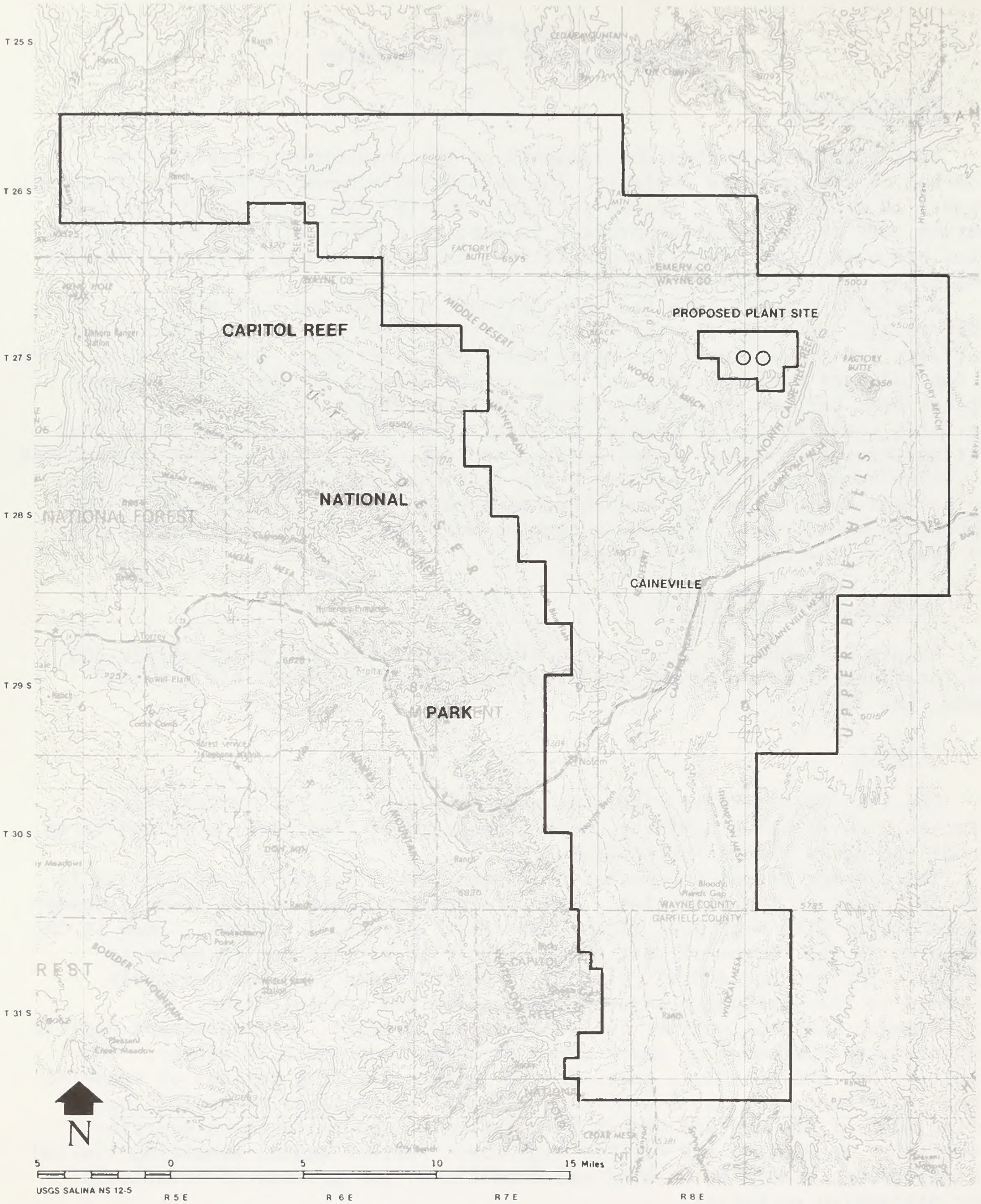
1. Climate

The Salt Wash site is within an area characterized by limited precipitation, low relative humidity, high percentage of clear-sky days, and large annual and daily ranges in temperature.

The average annual precipitation ranges from 5 inches in the valleys to over 30 inches in the mountains. Much of the rain comes in the form of summer thunderstorms with high peak flows, but relatively small volumes. Snow in the mountains is the source of most of the runoff to streams and recharge to springs. The average annual rainfall in desert areas is almost entirely returned to the atmosphere through evaporation and transpiration.

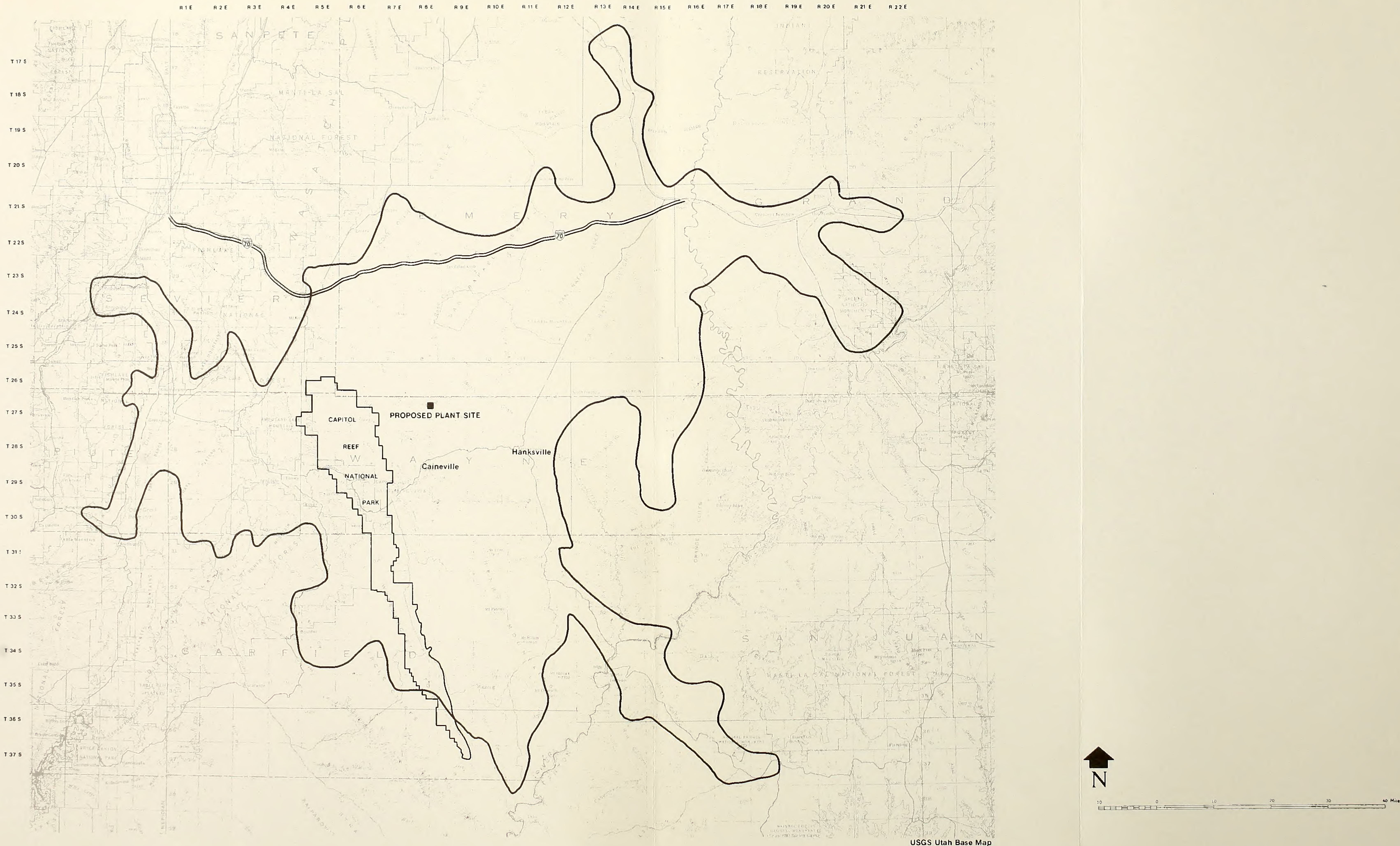
A major seasonal weather influence is a migratory, semi-permanent Pacific high pressure system which moves north in summer and south in winter. The result is dry and cloudless skies in the summer with long periods of sunshine promoting strong vertical air mixing. Neutral or unstable conditions occur during much of the day and result in relatively good pollution dispersion potential. In winter, the Pacific high moves further south, permiting limited precipitation, stable meteorological conditions, and periods of relatively poor dispersion potential.

Although the area is located within a belt of westerly prevailing upper atmosphere winds, it is the topography which provides the major influence on diffusion characteristics (Regional Air Quality Study, ERT 1977). Unequal heating and cooling of the ground generates a diurnal mountain-valley flow which, in conjunction with channeling of the wind through the canyons and river valleys, dominates air movement near the ground throughout the year.



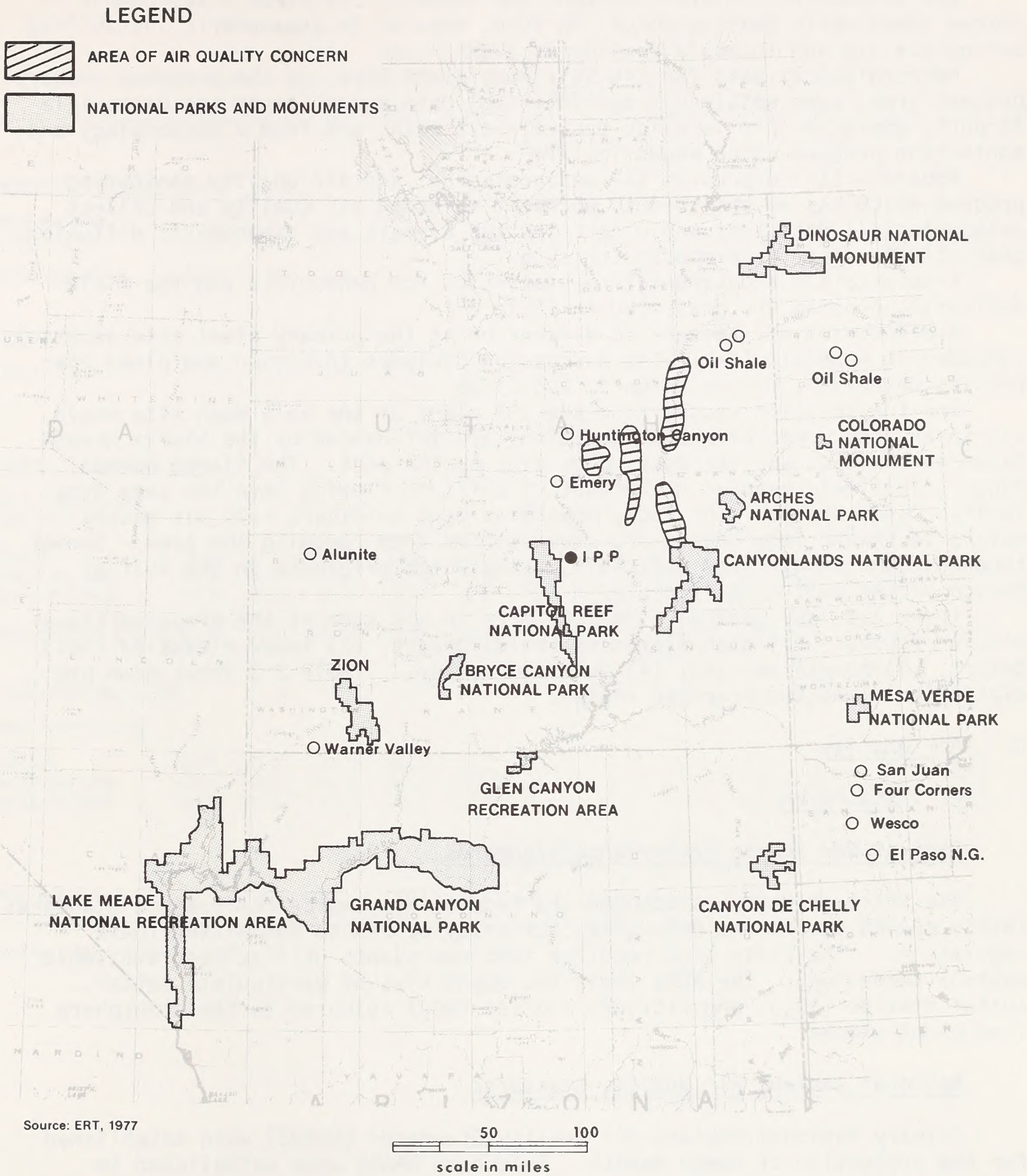
PRIMARY PROJECT AREA

FIGURE 2-1



IPP REGIONAL SETTING

FIGURE 2-2



AREAS OF AIR QUALITY CONCERN AND LOCATIONS OF OTHER ENERGY CONVERSION PROCESSES

FIGURE 2-3

Low atmospheric moisture content and normally cloudless skies result in strong atmospheric heating which, in turn, results in atmospheric instability during the day and in rapid cooling at night.

Meteorological data for the Salt Wash plant site, in the proposed primary project area, were obtained from historical data summaries at the Hanksville Airport, approximately 16 miles east of Salt Wash, and from a meteorology and monitoring program which began in 1974.

Appendix II-1 discusses the meteorological and air quality monitoring program which was established to document existing air quality and collect meteorological data that would describe the climate and atmospheric diffusion charactistics for the proposed IPP site.

Precipitation and temperature statistics for Hanksville and the field monitoring program are presented in Table 2-1.

A discussion of atmospheric dispersion at the primary plant site is also included in Appendix II-2. The discussion includes inversion and plume dispersion potential, mixing heights, and winds.

The transmission routes from the IPP plant at the Salt Wash site would lie in an area where climatic conditions are influenced by the Sierra Nevada Range on the west and the Rocky Mountains on the east. The Sierra Nevada Range effectively reduces the amount of moisture flowing into the area from Pacific Ocean storms. The Rocky Mountains tend to divert cold air masses moving southward from Canada and prevent them from reaching the area. Summer thunderstorms result from moist air masses which originate in the Gulf of Mexico or the Gulf of California.

There are four general climatic zones in the area of the proposed transmission routes: (1) high elevation (cold) desert; (2) lower elevation (hot) desert, (3) mountains, and; (4) mountain valleys. Table 2-2 shows mean precipitation along the proposed routes.

2. Air Quality

a. Standards

Federal New Source Performance Standards

The State of Utah has adopted the Federal New Source Performance Standards (NSPS) 40 CFR 60 and has been given authority by EPA to administer these regulations. The state also requires that new plants utilize best available control technology. The NSPS limit the quantities of particulate matter, sulfur dioxide (SO_2), and nitrogen dioxide (NO_2) released to the atmosphere from plant stacks.

National Ambient Air Quality Standards

Primary National Ambient Air Quality Standards (NAAQS) were established for the protection of human health. Secondary NAAQS were established to protect public welfare, and prevent damage to animals, vegetation, and property. Primary and secondary national and state ambient air quality standards are shown on Table 2-3.

Prevention of Significant Deterioration Regulations

The air quality area of concern is classified as Class II under the EPA air quality regulations for Prevention of Significant Deterioration (PSD).

TABLE 2-1

Hanksville and Field Monitoring Program

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
						Month							
						Precipitation in Inches							
Hanksville Airport Data													
Mean Monthly (1941-1970)	0.22	0.20	0.30	0.44	0.33	0.38	0.46	1.02	0.48	0.71	0.33	0.33	5.02
Total (1975)	0.28	0.25	0.56	1.55	0.74	0.19	1.37	0.45	0.55	0.89	0.33	0.17	7.3
Field Program													
Total (1975)	0.12	0.22	0.35	0.51	0.29	0.54	0.21	0.08	0.52	0.56	0.18	0.09	3.7
						Temperature in Degrees Farenheit							
Hanksville Airport Data													
Mean Temperature 1941-1970													
Monthly	26.1	33.9	42.5	52.9	62.9	71.9	79.4	76.9	67.6	54.7	39.4	28.9	53.1
Daily Maximum	39.9	48.4	57.7	68.4	79.6	89.4	96.7	93.3	85.2	71.3	54.1	42.1	68.8
Daily Minimum	11.9	19.1	27.0	36.9	46.1	54.5	62.1	60.7	50.0	38.0	24.7	15.0	37.2
Mean Monthly (1975)	23.2	34.8	42.5	48.0	59.1	68.5	79.8	74.7	66.1	51.9	36.6	29.3	51.2
Field Program (1975)													
Mean Temperature													
Monthly	23.2	33.2	41.6	46.5	56.5	70.7	78.6	76.0	67.4	52.1	36.6	28.0	51.0
Daily Maximum	33.6	42.0	50.6	54.6	67.4	8.9	89.0	87.3	79.4	65.3	48.7	38.6	61.6
Daily Minimum	14.3	22.6	32.2	36.1	44.0	57.0	66.6	63.3	53.3	37.5	25.6	18.3	39.3
						Mean Dew Point Temperature in Degrees Farenheit							
Mean Monthly	16	19	16	23	27	30	38	40	28	26	19	13	25

Source: Westinghouse, 1977.

TABLE 2-2

Mean Precipitation Data for Locations Along the Transmission Routes

Location	Climate	Elevation (ft)	Mean Annual Precipitation (in.)
Loa, UT[a]	Mountain Valley	7,045	7.42
Circeville, UT[a]	Mountain Valley	6,000	7.78
Milford, UT[b]	Cold Desert	5,028	8.39
Modena, UT[d]	Cold Desert	5,460	8.75
St. George, UT[d]	Hot Desert	2,880	7.81
Las Vegas, NV[c]	Hot Desert	2,162	3.94
Desert Natl. Wildlife Range, NV[e]	Hot Desert	2,920	3.98
Ely, NV[c]	Mountain Valley	6,253	8.71
McGille, NV[c]	Mountain Valley	6,340	8.56
Caliente, NV[c]	Mountain Valley	4,402	8.71
Pioche, NV[c]	Mountain	6,120	13.37
Lehman Caves, NV[c]	Mountain	6,825	13.22
Cedar City, UT	Mountain Valley	5,601	9.97
Barstow, CA[e]	Hot Desert	2,142	4.27

[a]Climatography of the United States No. 11-37. "Climatic Summary of the United States--Supplement for 1931 through 1952, Utah," U.S. Dept. of Commerce, Weather Bureau.

[b]Climatography of the United States No. 86-37. "Climatic Summary of the United States, Supplement for 1951 through 1960, Utah." U.S. Dept. of Commerce, Weather Bureau.

[c]"Climatography of the United States No.20-26." U.S. Dept. of Commerce, NOAA.

[d]Climatography of the United States No. 60. "Climate of Utah," U.S. Dept. of Commerce, NOAA, 1977.

[e]"Probability of Selected Precipitation Amounts in the Western Region of the U.S.," U.S. Dept. of Agriculture and U.S. Dept of Commerce, October 1967.

TABLE 2-3

National and State Ambient Air Qualiy Standards
and Prevention of Significant Deterioration Increments

	National Ambient Air Quality Standards				Utah		Prevention of Significant Deterioration Increments					
	Primary[a]		Secondary[b]				Class I		Class II		Class III	
Emission	(μg/m³)	(p/m)	(μg/m³)	(p/m)	(μg/m³	(p/m)	(μg/m³)	(p/m)	(μg/m³)	(p/m)	(μg/m³)	(p/m)
Sulfur Dioxide												
Annual[c]	80	0.03	-----	----	80	0.03	2	0.0008	20	0.0057	40	0.0154
24-hour[d]	365	0.14	-----	----	365	0.14	5	0.0019	91	0.0380	182	0.0700
3-hour[d]	---	----	1,300	0.50	1,300	0.50	25	0.0095	512	0.2660	700	0.2692
Particulate Matter												
Annual[e]	75	----	60	----	[f]----		5	------	19	------	37	
24-hour[d]	260	----	150	----	[f]----		10	------	37	------	75	
Nitrogen Dioxide												
Annual[c]	100	0.05	100	0.05	[f]----		--	------	---	------		
Oxidants												
1 hour	160	0.08	-----	0.08	[f]----		--	------	---	------		

Source: Clean Air Act Amendments (1977) and Utah Air Quality Regulations (1978).

[a]Protection of Human Health.

[b]Protection of welfare including damage to animals, vegetation, visibility, and property.

[c]Annual arithmetic mean.

[d]Not to be exceeded more than once per year.

[e]Annual geometric mean.

[f]Federal standards are quoted in the Utah regulations but have not been formally adopted by the State.

These regulations are intended to protect uniquely clean air by preventing further significant degradation. Areas which fall under these regulations are designated as Class I, II, or III. Class I areas are designated where practically any change in air quality would be significant. Class II applies to areas where deterioration resulting from well-planned growth would not be considered significant. Class III allows more extensive industrial development and population growth. Pollution increments which would be considered significant for all three classes are also included on Table 2-3.

The primary plant site is located in a PSD Class II area. Capitol Reef National Park (9.6 miles southwest), Canyonlands National Park (39.6 miles east), and Arches National Park (71.4 miles east) are Class I areas under the 1977 Clean Air Act Amendments (P.L. 95-95). Each of these Class I areas has been identified by the National Park Service as having important visibility value.

In cases where a permit may be denied, because SO_2 short-term Class I standards could be exceeded, the governor of a state may grant a variance of up to 18 days with the concurrance of the appropriate federal land manager. If the governor and federal land manager disagree, then the President makes a final determination.

b. Existing Air Quality

Total suspended particulate concentrations were monitored daily from August to December 1974 near Emery, Utah (University of Utah, 1974). The concentration averaged 26 micrograms per cubic meter ($\mu g/m^3$). The Secondary 24-hour NAAQS (150 $\mu g/m^3$) was exceeded once (179 $\mu g/m^3$) in September 1974. The particle type was wind blown dust. The average particulate types collected during the sampling period were identified as soil dust (91 percent by weight), fly ash (7 percent), sulfate (1.6 percent) and soot (1 percent). The natural fallout of particulates was 1.8 tons per square mile per month (tons/mi^2/month). Particulate in these samples was 94 percent soil particles.

Gaseous pollutants were also monitored near Emery, Utah for 2-week periods in July and December 1974 for background concentrations. Average sulfur dioxide (SO_2) for various sites near Emery in July were barely detectable. During December, SO_2 concentrations averaged about 5 $\mu g/m^3$ (1.0 percent of daily NAAQS) at three sites in the Emery vicinity. The average nitrogen dioxide (NO_2) concentrations were also near the lower limit of detection. These concentrations are representitive of background levels throughout the area of air quality concern.

Measurements of ambient concentrations of SO_2, NO_2, O_3 and particulates were made near the Salt Wash site during four seasonal programs (see Appendix II-2). Measured concentrations are summarized in Table 2-4. SO_2 concentrations never exceeded the lowest detectable reading of the instrument--13 $\mu g/m^3$. NO_2 concentrations were also quite low; the highest 1-hour value recorded was 42 $\mu g/m^3$. Ozone concentrations were highest during the spring. These relatively high O_3 concentrations are not uncommon at this altitude in relatively isolated areas. Particulate concentrations were generally quite low; the highest 24 hour concentration was 90.3 $\mu g/m^3$ during the spring.

Ambient air quality standards stipulate that pollutant concentrations should be measured over various averaging times. Salt Wash pollutant concentrations are summarized in Table 2-4 under the "All Seasons" heading. Values are maximums recorded for the various averaging times. They are also expressed in percent of the National Ambient Air Quality Standards (NAAQS). Generally, air quality for the area is good.

TABLE 2-4

One Hour Average Concentrations of SO_2, NO_2, and O_3
and 24-Hour Average Total Suspended Particulate (TSP) Concentrations
Near the Primary Plant Site

	SO_2 µg/m^3	NO_2 µg/m^3	O_2 µg/m^3	TSP µg/m^3
	Summer (August 20 - September 3, 1974)			
Mean	<13	12	--	
Maximum	<13	42	--	70.0
Minimum	<13	10	--	25.6
Geometric Mean (TSP)				40.5
	Fall (October 16 - November 11, 1974)			
Mean	<13	10	<20	
Maximum	<13	--	<20	24.8
Minimum	<13	10	<20	6.8
Geometric Mean (TSP)				12.34
	Winter (January 15 - February 11, 1975)			
Mean	<13	12	82	
Maximum	<13	38	104	34.8
Minimum	<13	10	420	4.6
Geometric Mean (TSP)				12.2
	Spring (April 10 - April 27, 1976)			
Mean	<13	18	80	
Maximum	<13	38	134	90.3
Minimum	<13	10	28	10.7
Geometric Mean (TSP)	<13			27.5

	% of Yearly Primary NAAQS	Maximum 1-hour	All Seasons Maximum 3-hour	Maximum 24-hour	Yearly Average
SO_2	16	<13 µg/m^3	<13	<13	<13
NO_2	14	42			14
O_3	38	134			60
TSP	25			90.3	19

Source: Westinghouse, 1977.

Visibility, in general, in this area of southern Utah exceeds 50 miles the majority of the time. Visibility restrictions and yearly variations in visibility are due primarily to natural causes.

Visibility observations were made to document the existing visibility and to determine normal causes and frequency of visibility restrictions in the area. From 1975 through 1976, observations were made twice per day from a point near the plant site, Fairview Ranch, to three prominent distant terrain features. The features were the LaSal Mountains--85 miles east of the observation point; the Book Cliffs--73 miles to the north; and Fishlake Mountain-58 miles to the West. Results of the study are summarized in Table 2-5.

Dust and haze cause visibility restrictions approximately 6 percent of the time. The combination of clouds, dust, fog, and haze were definitely identified as sources of visibility reduction 14 percent of the time. Statistics on fog are not available for the Hanksville Airport. Heavy fog, visibility 1/4 mile or less, occurs infrequently in dry, arid climates. Based on data from a limited number of stations in Utah, heavy fog can be expected to occur on the average of 3 to 6 days per year (U.S. Dept. of Commerce, 1960).

Hourly visibility observations, made at the Hanksville, Utah, Airport during the period January 1949 through December 1954, were also used to establish baseline visibility data in the vicinity of the Salt Wash site (Bowers, 1978). Those data, which were separated by season and period of daylight hours, show that the mean visibility in the Hanksville area ranged from about 42 to 49 miles (67 to 79 kilometers). The shortest visibility ranges were in the late afternoon in the spring and the longest ranges were in the summer mornings. Table 2-6 shows the mean visibility by season and period of daylight hours alone, with the standard deviation of the visibility measurements. It should be noted that the maximum distance from the Hanksville Airport to a visibility marker was reported as 50 miles (80 kilometers) whenever the visual range was greater than or equal to 50 miles (80 kilometers). Thus, the mean Hanksville visual ranges in Table 2-6 probably underestimates the mean visual range. Westinghouse (1977) estimates that the existing background clean air visual range is approximately 87 miles.

C. TOPOGRAPHY, GEOLOGY, MINERAL RESOURCES AND PALEONTOLOGY

1. Regional Setting

The proposed IPP generating station and support facilities would be located within the San Rafael Swell division of the Colorado Plateau (Energy Resources Map of Utah, 1975). The plateau-like terrain was created as more resistant rock formations formed cliffs and the softer formations below were eroded. In areas where the strata have been tilted, the soft units form valleys and the resistant ones form ridges.

The project area, shown on Figure 2-4, bounded by the Waterpocket Fold, the Henry Mountain Basin, the Moroni Slopes, and the Paradise Basin, is known as the Last Chance Saddle. Elevations reach 8,000 feet near Thousand Lake Mountain, but generally range from 4,700 to 6,000 feet across the washes, benches, flats, and slopes. Abrupt elevation changes up to 400 feet mark the differential erosion patterns at Wood Bench, Caineville Reef, and the Red Desert.

The Navajo Sandstone is a 400 to 1,400 foot thick unit of resistant, massive, highly crossbedded, fine to very fine grain sandstone. Within the boundaries of Last Chance Saddle, the moderately jointed Navajo Formation outcrops only along Waterpocket Fold, but does extend laterally across the

TABLE 2-5

Summary of Visibility Observations
(January 1975 - December 1976)

Visibility Distance (miles)	Percent of Days the Distance of Visibility Occurs	Cumulative Percentage of Days	Percent Occurrence of Visibility Restrictions			
			Clouds	Dust	Fog	Haze
		Book Cliff (73 miles north)				
0-20	9.7	9.7	25.8	12.1	5.7	14.5
21-40	6.7	16.4	16.5	4.7	1.2	11.8
41-60	36.2	52.6	7.8	1.0	0.0	8.9
61-80	45.4	98.0	0.3	0.2	0.0	0.2
>80	2.0	100.0	0.0	0.0	0.0	0.0
		LaSal Mountains (85 miles east)				
0-20	14.7	14.7	29.8	4.3	3.2	13.3
21-40	7.1	21.8	26.4	4.4	1.1	22.0
41-60	10.5	32.3	12.7	1.5	0.0	8.2
61-80	10.0	42.3	0.0	0.0	0.0	0.0
>80	1.1	100.0	0.0	0.0	0.0	0.0
		Fishlake Mountains (58 miles west)				
0-20	11.6	11.6	25.2	7.5	6.8	6.8
21-40	6.3	17.9	21.3	3.8	0.0	3.8
41-60	80.0	97.8	4.3	0.3	0.0	4.1
61-80	1.0	98.9	0.0	0.0	0.0	0.0
>80	1.1	100.0	0.0	0.0	0.0	0.0

Source: Westinghouse, 1977.

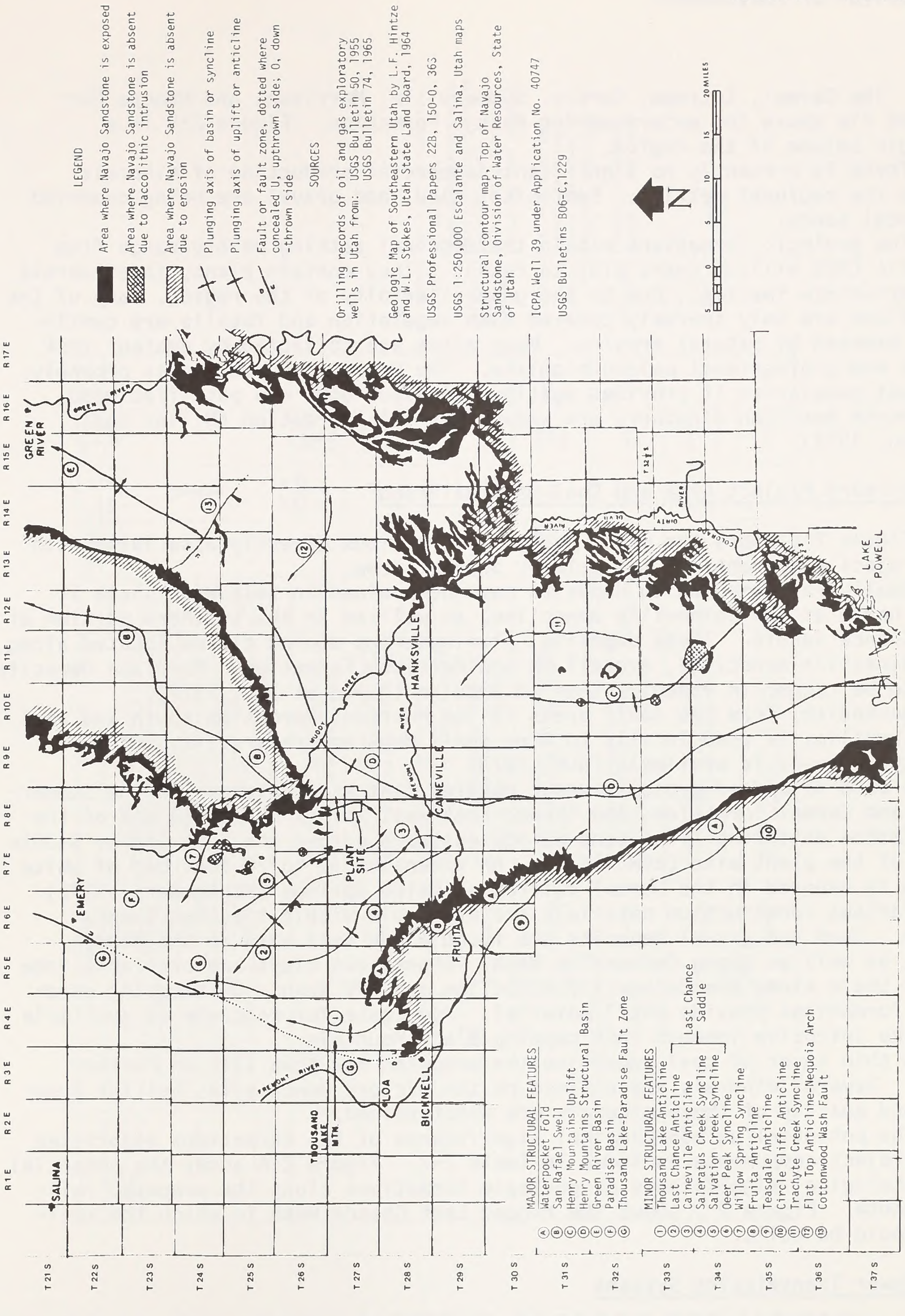
Note: Observations were made from Fairview Ranch 13 miles south of Hanksville, (January 1975-December 1976).

TABLE 2-6

Mean Distance and Standard Deviation of Visibility at Hanksville, Utah During the Period 1949 through 1954

	Morning (Miles)		Midday (Miles)		Late Afternoon (Miles)	
Season	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Winter	43.2	13.8	44.6	11.9	42.3	13.7
Spring	45.7	10.6	46.5	9.5	41.6	13.8
Summer	49.0	5.7	48.8	5.4	44.4	12.1
Fall	47.3	2.7	47.8	7.6	44.7	11.7
Annual	46.3	10.4	47.3	8.4	43.2	12.9

Source: Bowers, et al., 1978.



REGIONAL STRUCTURAL FEATURES

FIGURE 2-4

area. The Carmel, Entrada, Curtis, Summerville, Morrison, and Mancos Formations lie above the water-bearing Navajo Formation. Figure 2-5 is a geologic column of the region.

There is presently no significant commercial production of minerals within the regional setting. Bentonite, sand, and gravel are being quarried for local needs.

The geologic formations within the regional setting mainly range from Triassic (225 million years old) to recent. They contain plant, invertebrate and vertebrate fossils. Due to the general aridity of the region, many of the formations are only sparsely covered with vegetation and fossils are continually exposed by natural erosion. Many sites are collected by amateur rock hounds and professional paleontologists. The Morrison Formation is probably the most popular as it provides agatized dinosaur bone and petrified wood. Most North American dinosaurs are known from this formation (Miller and Robison, 1977).

2. Primary Project Area and Coal Haul Railroad

Figure 2-6 shows the major geologic formations directly associated with the project components in the primary project area.

Small uranium-vanadium deposits have been mined in Salt Wash where it turns north at the Caineville monocline, as well as in the southern portion of Last Chance Saddle. These deposits, plus numerous mining claims located along the Caineville monocline, are all in the Morrison Formation. Morrison deposits tend to be richer in vanadium than in uranium (Hayes et al., 1977).

Bentonite, from two small areas in the Morrison Formation south and west of Caineville, is used locally to line small dams and reservoirs, but no quality analysis is available (BLM, 1975).

A band of bedded gypsum several hundred feet wide outcrops in the Summerville and Carmel formations and trends southwest across the north end of the Last Chance anticline. The band swings eastward across the Last Chance Saddle south of the plant site (BLM, 1975). An extensive 15 to 20 foot bed of white gypsum is exposed in the Carmel outcrop at Caine Springs (Montgomery, 1972).

Various construction materials are available within the Last Chance Saddle. Sand and gravel deposits are found along Salt Wash in the Middle Desert as well as along Caineville Wash. Impervious clays are available from Mancos Shale along the Caineville monocline and Dry Wash. Outcropping sandstone formations provide shell material. Aggregate for concrete is available from the intrusive igneous rock capping Black Mountain.

A thin layer of coal underlies the proposed new town site on Factory Bench. Several minerals are claimed on the Factory Bench site, but the quantity and quality of these minerals are undetermined.

The potential paleontological significance of the formations associated with project components is shown in Table 2-7. Figure 2-A shows the potential paleontological significance of geologic formations along the proposed railroad route. Figure 2-7 shows the rugged Last Chance Wash in which the railroad would be built.

3. Power Transmission Systems

Areas crossed by the proposed power transmission systems contain a variety of valuable geologic and mineral materials such as metals and fossil fuels as shown on Figure 2-8.

SYSTEM	SERIES	LITHOLOGY	GROUP	FORMATION / MEMBER	DESCRIPTION	THICKNESS: GENERAL	THICKNESS: TW-1	THICKNESS: OW-1A	DRILLABILITY 9 7/8 HOLE: GEN.	DRILLABILITY 9 7/8 HOLE: FT/HR
QUATERNARY					ALLUVIUM & TERRACE SANDS & GRAVELS		MISSING	MISSING		
CRETACEOUS	UPPER			MESAVERDE	YELLOW SANDSTONE, THIN SHALE BEDS	300				
			MANCOS	MASUK	GRAY SANDY SHALE	600-800				
			MANCOS	EMERY	SANDSTONE SHALE & COAL	250				
			MANCOS	BLUE GATE	BLUE-GRAY SHALE	1400+				
			MANCOS	FERRON	SANDSTONE, SHALE & COAL	250				
			MANCOS	TUNUNK	BLUE-GRAY SHALE	575±				
	LOWER			DAKOTA	WHITE SANDSTONE & CONGLOMERATE	0-100		TOP OF GROUND		
JURASSIC	UPPER		MORRISON	BRUSHY BASIN	SOFT GRAY TO REDDISH PURPLE BENTONITIC CLAYSTONE WITH SOFT TO HARD PEBBLY SANDSTONE LENSES.	160-400		310	SOFT TO HARD	3-25
			MORRISON	SALT WASH	HARD TO SOFT, COARSE TO FINE GRAINED CONGLOMERATIC SANDSTONE WITH VARI-COLORED SILTSTONE & CLAYSTONE LENSES	30-250		245	HARD TO MOD	2-18
			SAN RAFAEL GROUP	SUMMERVILLE	HARD TO SOFT, THIN INTERBEDS OF VARI-COLORED SILTSTONE, CLAYSTONE & SAND-STONE, GYPSUM ON BEDDING & JOINTS	200-250		240	HARD	2-7.5
			SAN RAFAEL GROUP	CURTIS	MOD. FIRM FINE GRAINED SANDSTONE & SILTSTONE-UPPER PART; HARD, GRAY CEMENTED SANDSTONE-LOWER PART	0-200		95?	HARD	1.5-7
			SAN RAFAEL GROUP	ENTRADA	SOFT TO HARD AND WELL CEMENTED, REDDISH BROWN, SILTY, FINE GRAINED SANDSTONE.	300-780	TOP OF GROUND 275	625	MOD TO HARD	2.5-18
	UPPER-MIDDLE		SAN RAFAEL GROUP	CARMEL	HARD TO SOFT, GRAY TO REDDISH BROWN SANDSTONE, SILTSTONE, CLAYSTONE, LIMESTONE AND GYPSUM BEDS WITH MOST OF LIMESTONE IN LOWER PART	200-1000	434	474	HARD	2-11
	LOWER		GLEN CANYON GROUP	NAVAJO	AQUIFER, FIRM TO SOFT, FINE TO VERY FINE GRAINED, WHITE, CROSS BEDDED, EOLIAN SANDSTONE, MODERATELY, FRACTURED.	400-1400	911	364+ TOTAL DEPTH	SOFT TO MOD.	10-37.5
TRIASSIC ?	UPPER		GLEN CANYON GROUP	KAYENTA	FIRM TO SOFT, WHITE TO REDDISH BROWN SANDSTONE, & SILTSTONE	350±	65+ TOTAL DEPTH		MOD.	10-15

NOTES:

1. IGNEOUS ROCKS OF THE TERTIARY SYSTEM NOT DESCRIBED:

LATE EOCENE AND OLIGOGENE { HENRY MOUNTAIN INTRUSIVES, DIKES & SILLS SOUTHWEST OF SAN RAFAEL SWELL; LAVA FLOWS & TUFF BEDS, THOUSAND LAKE MOUNTAIN

2. OLDER ROCKS NOT DESCRIBED:

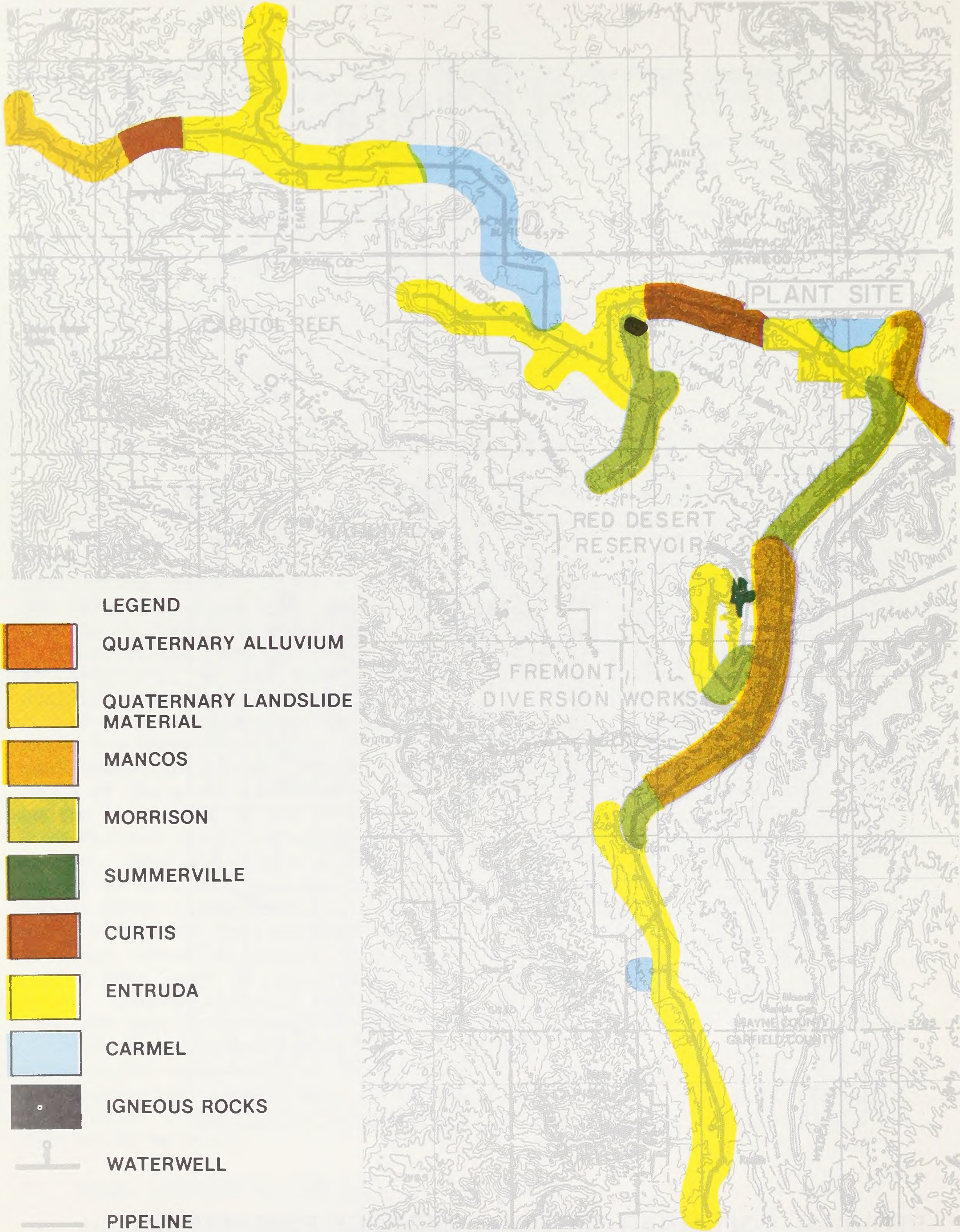
TRIASSIC { WINGATE SANDSTONE; CHINLE FORMATION; MOENKOPI FORMATION

PERMIAN { KAIBAB LIMESTONE; COCONINO SANDSTONE

REFERENCES:
GILLULY, 1928
HUNT, 1953
SMITH ETAL, 1963
DAVIDSON, E.S., 1967

REGIONAL COLUMNAR SECTIONS BEDROCK FORMATIONS

FIGURE 2-5



GENERALIZED GEOLOGIC FORMATIONS ASSOCIATED WITH PROJECT COMPONENTS IN THE PROJECT AREA

FIGURE 2-6

TABLE 2-7

Potential Fossil Types and Paleontological Significance of Geologic Formations Associated With Project Components

Geologic Formation	Potential Types of Fossils[a]	Potential Paleontological Significance[b]
Mancos	Marine reptiles, fish, invertebrates, and plant fragments	High
Morrison	Dinosaurs, crocodiles, invertebrates, and plants	High
Summerville	No diagnostic fossils known	Low
Curtis	Marine invertebrates	Medium
Entrada	No diagnostic fossils known	Low
Carmel	Marine invertebrates	Medium

[a]The formations have not been inspected at the proposed project sites. The potential for fossils is inferred from literature search (Ash, 1975; Miller and Robison, 1978).

[b]Significance ratings are explained in Appendix II-3.

LAST CHANCE WASH

FIGURE 2-7

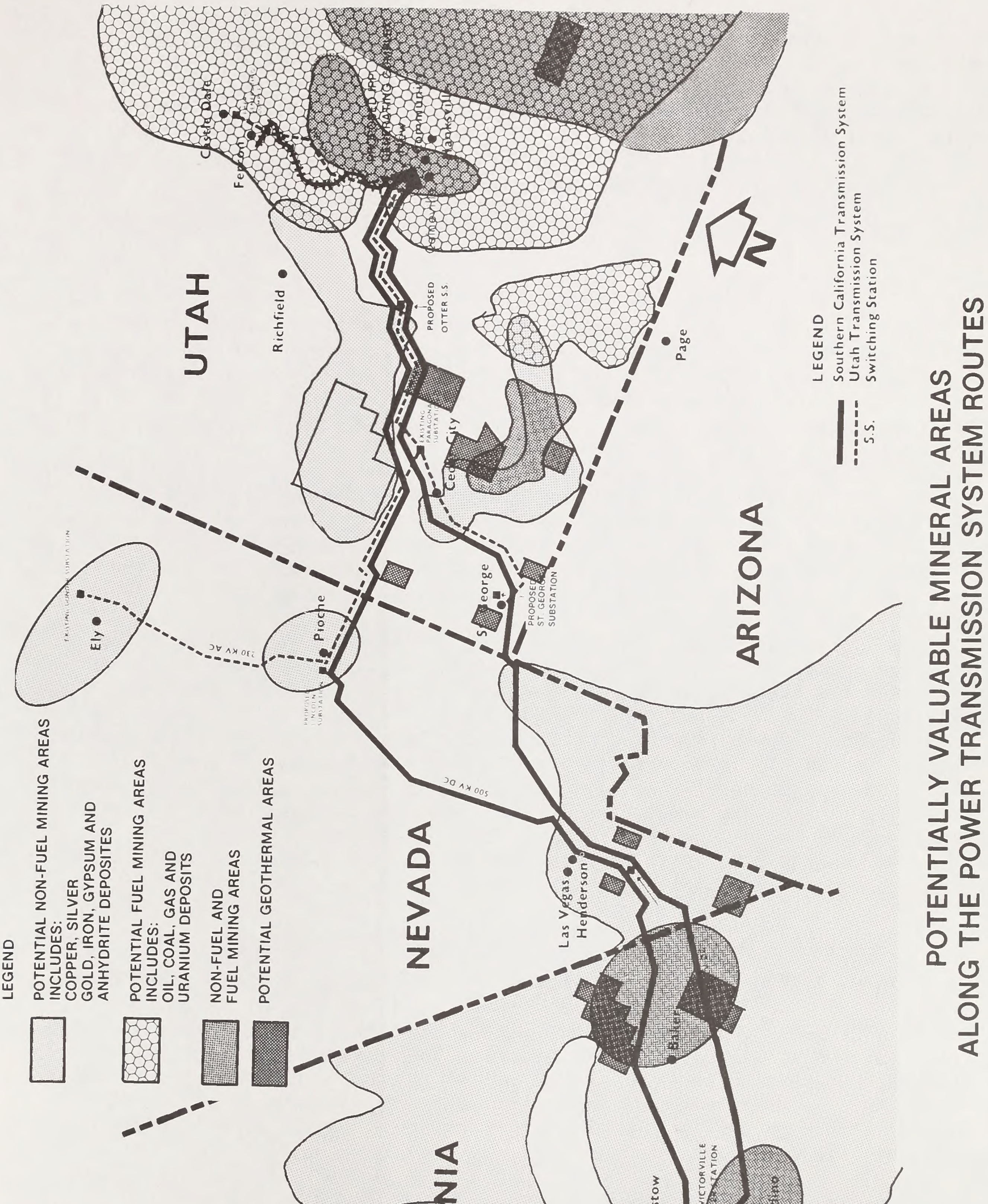

POTENTIALLY VALUABLE MINERAL AREAS
ALONG THE POWER TRANSMISSION SYSTEM ROUTES
LEGEND
POTENTIAL NON-FUEL MINING AREAS
INCLUDES:
COPPER, SILVER
GOLD, IRON, GYPSUM AND
ANHYDRITE DEPOSITES
POTENTIAL FUEL MINING AREAS
INCLUDES:
OIL, COAL, GAS AND
URANIUM DEPOSITS
NON-FUEL AND
FUEL MINING AREAS
POTENTIAL GEOTHERMAL AREAS
LEGEND
Southern California Transmission System
Utah Transmission System
S.S.
Switching Station
UTAH
NEVADA
ARIZONA
N
Richfield
Page
Ely
Pioche
230 KV AC
500 KV DC
PROPOSED
OTTER S.S.
EXISTING
PARAGONAH
SUBSTATION
PROPOSED
ST GEORGE
SUBSTATION
Las Vegas
Henderson
Baker
Barstow
San Bernardino
PROPOSED VICTORVILLE
CONVERTER STATION

FIGURE 2-8

The paleontological significance of formations along the proposed transmission systems is shown on Figures 2-B through 2-M. Approximately 3 percent (27 miles) of the corridor in the Southern California and 7 percent (14 miles) of the corridor of the Utah Transmission system would be located on formations with potentially high paleontological significance (Miller and Webb, 1978). Significance criteria for the highly significant geologic formations and their locations are listed in Appendix II-3.

D. SOILS

1. Regional Setting

Soils in the regional setting, shown on Figure 2-9, include deep alluvial valley soils, shallow shale clay soils (badlands), and shallow rocky soils (rocklands) (SCS, 1964, 1971, and 1975). Shallow soils receive less than 10 inches of rainfall per year and provide limited livestock forage and wildlife habitat. Control of soil loss and heavy sediment production are major problems in the "badlands" and "rocklands" areas.

Mountain-foothill soils can be found on the Boulder, Henry, and Thousand Lake Mountains. These soils receive upwards of 14 inches of precipitation along foothills and more than 24 inches on mountains. They are suitable for the production of forage, wildlife habitat, and wood products.

Desert soils (sandy soils) are located northeast of Hanksville and receive less than 10 inches annual precipitation and support rangeland for cattle and habitat for wildlife.

It is estimated that it takes as many as 10 years to revegetate the mountain and foothill soils (14 inches of annual precipitation and up) and 20 years for the other soils described above (10 inches or less of annual precipitation).

As shown on Figure 2-9, a part of the desert soils (sandy soils) northeast of Hanksville is a critical wind erosion area because of sparse plant cover and dry nature of the soils. The area is approximately 200,000 acres in size. It is estimated that revegetation on these areas may take up to 20 years.

The remaining soils in the regional setting are not susceptable to serious wind erosion, because they have more plant cover.

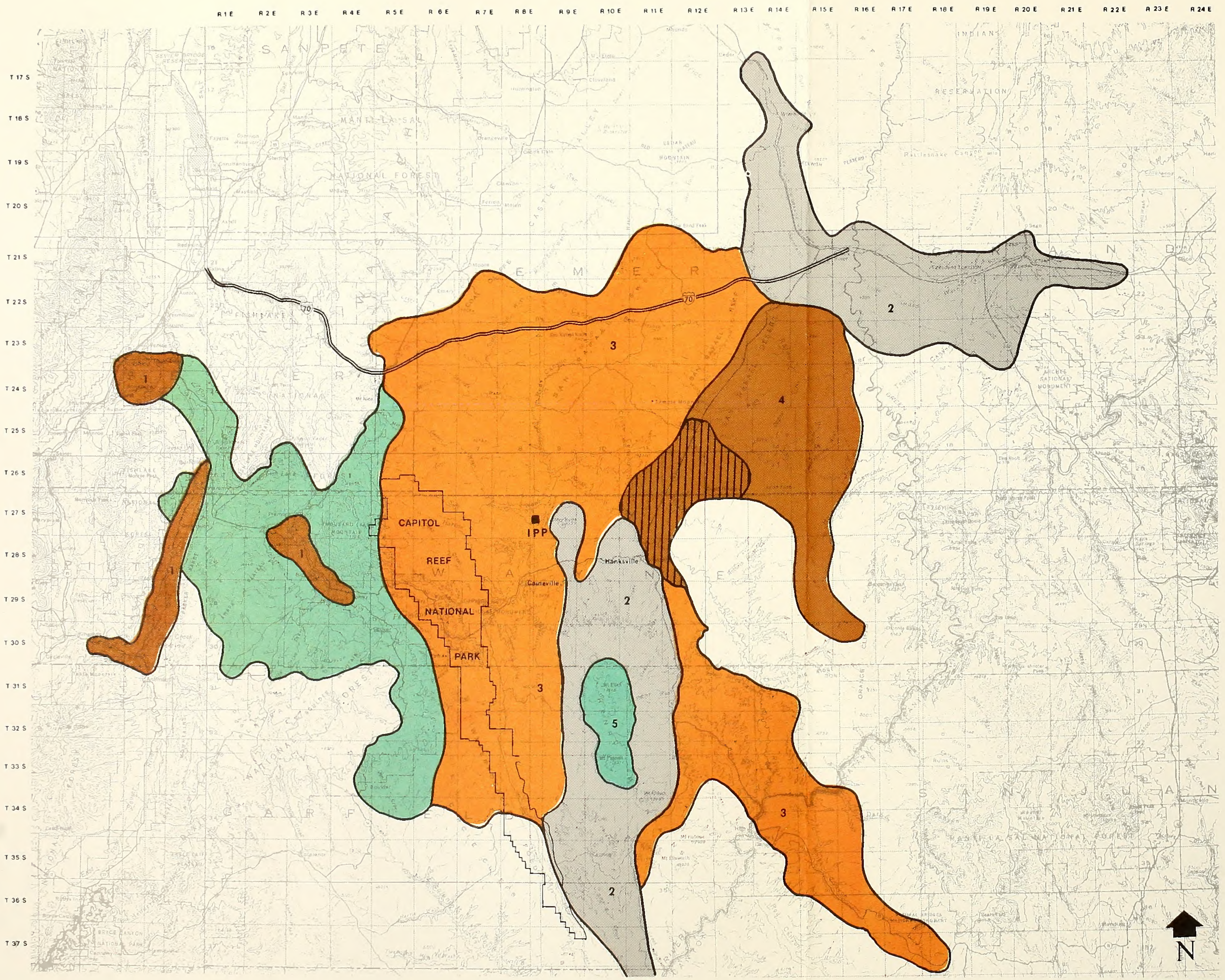
2. Primary Project Area and Coal Haul Railroad

Figure 2-10 shows the distribution of soils types in the primary project area and Figure 2-11 is a photograph of soils at the Factory Bench town site.

All project components would be on soils which have high natural erosion rates (Wilson et al., 1975). The hazard of water erosion is high but the soils are classified as having no serious wind erosion hazard. Figure 2-A shows that the proposed coal haul railroad would cross approximately 45 miles of soil with high erosion hazard, mainly in Castle Valley and immediately south of I-70.

3. Power Transmission System

Transmission routes for both the Southern California and Utah Transmission Systems would cross over the same range of soils as described for the regional setting (see Figures 2-B through 2-M at the end of this chapter). Desert soils in Central Utah and Northern Nevada are of the cold desert types

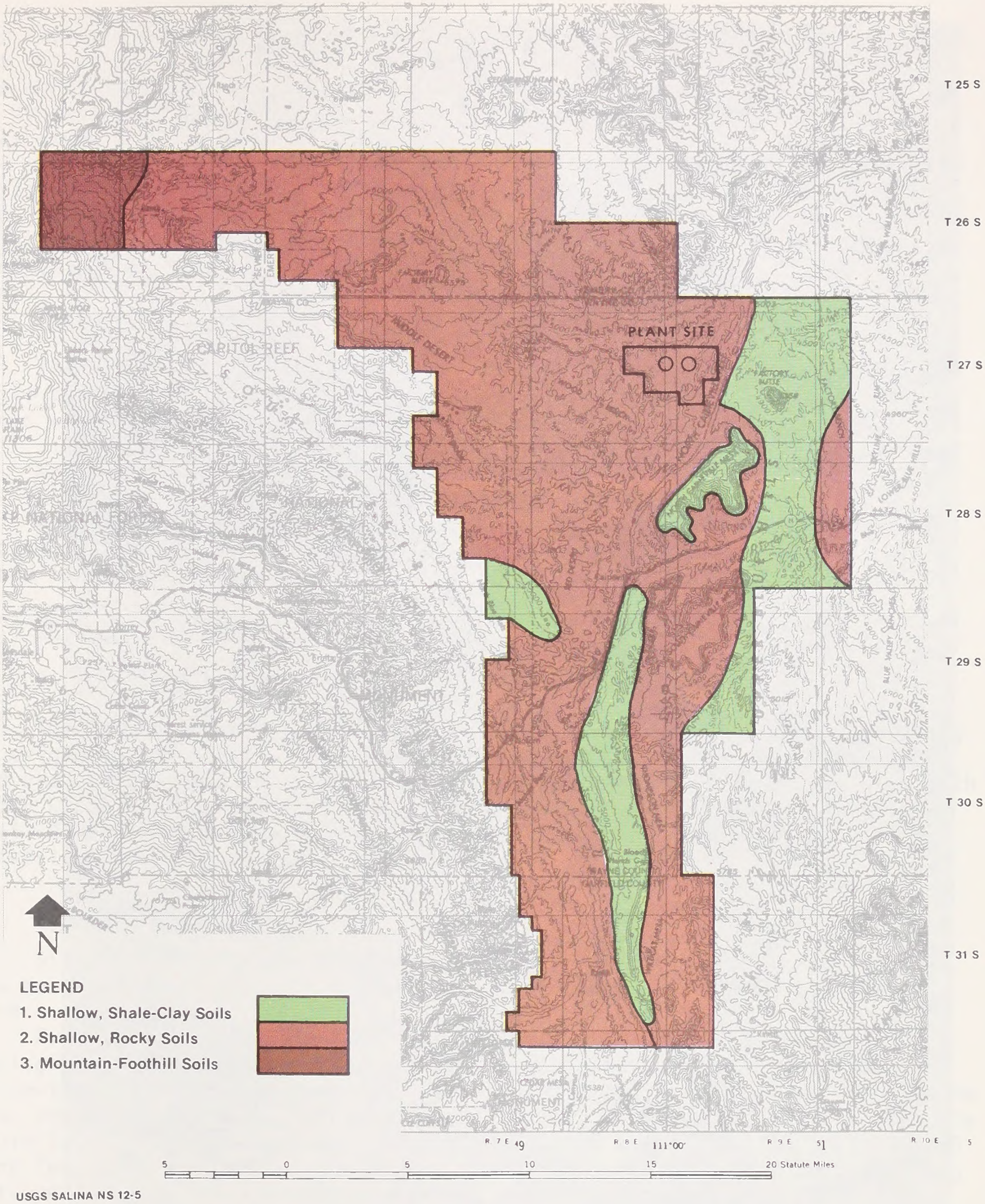


LEGEND

1. Deep Alluvial Valley Soils
2. Shallow, Shale-clay Soils
3. Shallow, Rocky Soils
4. Desert Soils
5. Mountain-Foothill Soils
6. Critical Wind Erosion Area

SOIL TYPES WITHIN THE REGIONAL SETTING

FIGURE 2-9



SOILS OF THE PRIMARY PROJECT AREA

FIGURE 2-10

TOWN SITE SOILS

FIGURE 2-11

and those in southern Utah, Nevada and California are of the hot desert types. Hot desert soils form in areas which receive 2 to 6 inches of precipitation and experience high evapotranspiration rates. Cold deserts soils receive up to 10 inches of precipitation. These soils range from clays to gravels to fine sands.

Approximately 500 miles (46 percent) of the corridor would be located on soils with moderate to high or severe erosion hazard. (Wilson et. al., 1975; SCS, 1932, 1957, 1968, 1970, 1971, 1977). Between mileposts 22 and 26 of the Salt Wash to Jack Henry Junction Segment (Figure 2-B) soils are severely susceptible to erosion and slumping.

4. Microwave System

The Moroni Slopes microwave site would be located on shallow rocky soils while the Elkhorn site would be located on mountain soils. Both microwave sites would be in areas of high erosion hazard.

E. WATER RESOURCES

Both surface and ground water would be used in the proposed power plant. Location of the water sources and the presumed areal extent of concern are shown in Figure 2-12.

1. Regional Setting and Primary Project Area

a. Surface Water

The Fremont River is the principal surface water in the regional setting. It originates on the Fishlake, Awapa, and Aquarius plateaus and flows south and east through south-central Utah for approximately 80 miles. It joins with Muddy Creek near Hanksville, Utah to form the Dirty Devil River. The Dirty Devil River flows to the Colorado River (Lake Powell) 45 miles southeast of Hanksville (see Figure 2-12).

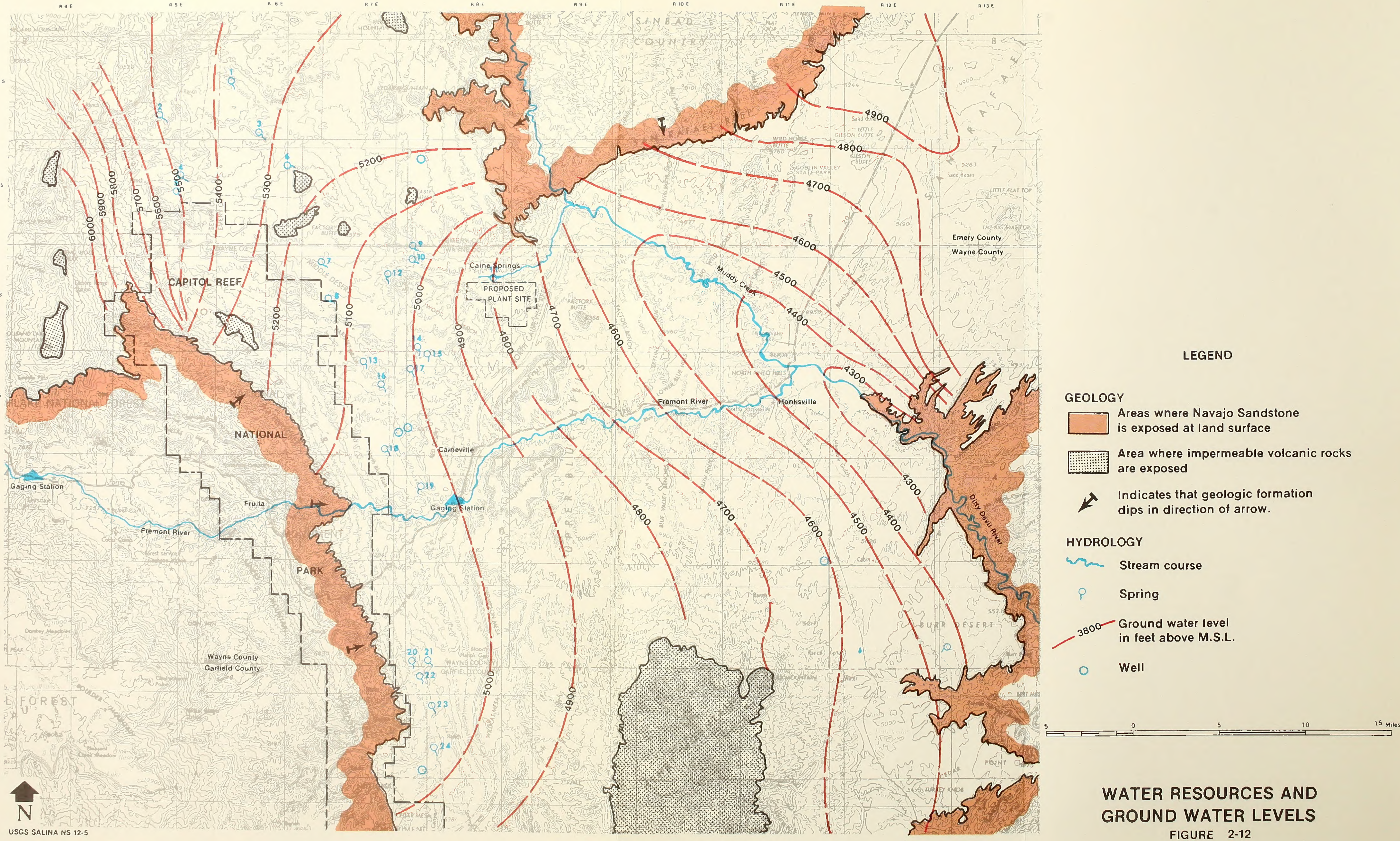
(1) Streamflow Records

Sites for which river flow data are available are shown in Figure 2-12. The monthly flow records at these gaging stations are tabulated in Appendix II-4.

Fremont River discharge has been recorded since March 1967 at the U.S. Geological Survey (USGS) gaging station approximately 4 miles southwest of Caineville and just upstream from the proposed IPP water diversion works. The mean annual discharge past this station is about 50,000 acre-feet. During the nonirrigation season, November through March, the average discharge is 26,350 acre feet or 52 percent of the annual discharge. Consumptive demands, during this period, are for livestock watering, wildlife, and domestic uses.

The average annual discharge is about 62,000 acre-feet at the USGS gaging station on the Dirty Devil River above Poison Spring Wash, approximately 32 miles downstream from the confluence of the Fremont River and Muddy Creek.

As the Fremont River cuts through Caineville Reef, the gradient is reduced and the river spreads out, taking on a characteristics of a braided stream. Evaporation, infiltration, and consumptive use by vegetation are heavy burdens on the river because of its physical setting. Very little, if any, water is passed on directly to the Dirty Devil River during the latter months of the irrigating season.



WATER RESOURCES AND GROUND WATER LEVELS

FIGURE 2-12

The Dirty Devil River receives water from the Navajo Sandstone, the Carmel and Entrada Formations, and outcrops of these formations in the Henry Mountains which is then transported through the structural basin to the Dirty Devil River.

(2) Surface Water Quality

Water quality in the upper part of the Fremont River is given in Appendixes II-5 and 6. These data indicate that Fremont River water quality deteriorates downstream as return irrigation water and discharge from Spring Creek enters the Fremont River (Bjorklund, 1969). Water quality in the Fremont River is higher in the winter than in the summer (USGS, 1976).

Water quality data for the Fremont River at Caineville (Appendix II-5) indicates that the water is fit for human consumption after treatment. The Fremont River continues to deteriorate downstream. Significant increases in chlorides, sulfates, and nitrates, as well as a general increase of total dissolved solids, indicate that the downstream deterioration is caused by return flow from irrigation, increased mineral concentration induced by evaporation, and periodic silt-laden flash floods.

The salinity of the Dirty Devil River is more than twice that of the Fremont River at Caineville. Geologic evidence strongly suggests that ground water from the Entrada Formation, an easily dissolved geologic formation, is recharging the Dirty Devil River.

(3) Sediments

Fremont River sediment discharges were recorded at the USGS gaging station near Caineville from March 1967 to May 1972 and are listed in Appendix II-7. An average of about 140 acre-feet of sediment was discharged annually. A single day high of 105,000 tons (80 acre-feet) was recorded on September 10, 1967. Extremely high or low sediment discharges can occur during any month. Most of the sediment load is generated in the sparsely vegetated areas of slickrock and clay formations located east of Capitol Reef National Park.

(4) Surface Water Use

In addition to agricultural use of water, phreatophytes consume about 10,000 acre-feet of Fremont River water per year (Fremont River Study, 1975). The Fremont River also loses about 2,500 acre-feet of water annually by evaporation between Caineville and Hanksville. Water consumption by phreatophytes, losses by evaporation and quantities used by livestock and wildlife amount to approximately 13,000 acre-feet each year (Fremont River Study, 1975).

b. Ground Water

Although several water bearing geologic formations exist in the area, the only aquifer capable of suppling large quantities of water is the Navajo Sandstone (Cordova, 1976).

(1) Aquifer Characteristics

Geologic maps and well records indicate that the Navajo Sandstone generally thins northeasterly from more than 1,000 feet to less than 500 feet thick and is approximately 900 feet thick in the proposed water well area.

The Navajo Sandstone has good water bearing characteristics and greater permeability and porosity than the overlying Carmel Formation or underlying Kayenta Formation.

Results of pump tests indicate that the Navajo standstone does not have a uniform capacity for the transmission of water. The upper part of the aquifer, especially where vertically fractured, is several times more transmissive than the lower part of the Navajo Sandstone.

The volume of recoverable water available in aquifer storage, based on a specific yield of 5 percent, is estimated at 12 million acre-feet. It has been estimated that if the ground water resources of the area were drained to an elevation of 3,000 feet above mean sea level, about 5 percent of the recoverable water would be withdrawn. This assumes that no recharge would occur and thus all withdrawn ground water would be "mined" from the aquifer.

(2) Ground Water Flow Regime

Figure 2-12 shows ground water elevations in the Navajo Sandstone in the project area and immediate surrounding area. Studies indicate that ground water flows from the higher elevations in an easterly and southeasterly direction. The Henry Mountains uplift splits the flows into two water regimes. One trends southerly while the second trends easterly.

(3) Recharge

Recharge to the ground water body in the project area is from three sources: percolation of precipation into exposed Navajo Sandstone, infiltration of runoff originating at higher elevations, and percolation from perennial and intermittent streams flowing over exposed Navajo Sandstone. Table 2-8 summarizes Navajo Sandstone recharge.

TABLE 2-8

Recharge to Navajo Sandstone

Recharge Area	Approximate Rate (Acre-Feet Annually)
San Rafael Swell and Waterpocket Fold	4,500 acre-feet
Thousand Lake Mountain	5,000 acre-feet
Fremont River	2,880 to 3,600 acre-feet
Oak and Pleasant Creeks	360 to 1,440 acre-feet
Muddy Creek	360 to 1,440 acre-feet
Ephemeral Streams	360 to 720 acre-feet

Probable range of total recharge to the aquifer of Navajo Sandstone is 11,000 to 15,400 acre-feet per year. A low estimate of total recharge to the aquifer is 4,300 acre-feet per year and a high estimate is 25,400 acre-feet per year.

(4) Discharge

Natural ground water discharge from the Navajo Sandstone occurs along the Muddy Creek and Dirty Devil River from 5 miles north of Hanksville to 10 miles southeast. Discharge also occurs along southern limits of the Henry Mountains near Lake Powell.

As many as 24 springs and seeps occur in the area of potential impact to ground water (see Figure 2-12). Appendix II-8 lists the springs and seeps. Caine Springs provides base flow (2.8 ft^3/s) for Salt Wash and a minor portion of the Muddy Creek flow. Figure 2-13 is a photograph of Caine Springs. Also four wells are currently producing water from the Navajo Sandstone formation (see Appendix II-8).

(5) Ground Water Quality

During pump test investigations, water samples were taken and analyzed. Results of these analyses are summarized in Appendix II-9. Water quality varies laterally and vertically within the Navajo Sandstone. Higher quality water is found near to areas of recharge and in the upper portions of the aquifer.

2. Power Transmission Systems

Within the Utah Transmission System the Salt Wash to Emery segment would cross two perennial streams, Muddy Creek and Ferron Creek, and one intermittent stream, Rock Canyon Creek. The Lincoln Junction to Gonder segment would cross some wetlands in Steptoe Valley, parallel Willow Creek, and cross Steptoe Creek and Comins Lake.

Table 2-9 lists perennial streams which would be crossed by the Southern California transmission system. All other stream courses are intermittent or ephemeral and flow occurs mainly in direct response to rainfall and snow melt.

F. VEGETATION

1. Regional Setting

Cold desert, pinyon-juniper, mountain brush, forest, and riparian vegetation grow within the regional setting as shown in Figure 2-14 (Oosting, 1956). Appendix II-10 lists representative plant species of each vegetation type. Riparian species such as willows, cottonwoods and tamarisk are typically found near water along the Fremont River, other streams, and at springs and seeps (Foster, 1968) (Harper, et al., 1975). Figure 2-15 is a photograph of riparian vegetation along the Fremont River.

The Henry Mountains, southeast of the Caineville area, provide unique habitat for a number of plants which are rare or endemic to either the Henry Mountains or Utah (Welsh, 1977b).

A list of proposed endangered plant species was published in the June 16, 1976 Federal Register. Lists of candidate threatened and endangered species have also been compiled, plants on these candidate lists may later be proposed for official listing. The official candidate list for Utah is the March 31, 1978 (Volume 38 No. 1) issue of the Great Basin Naturalist. Appendix II-11 lists those proposed, candidate and officially listed threatened and endangered plant species within the Salt Wash regional setting.

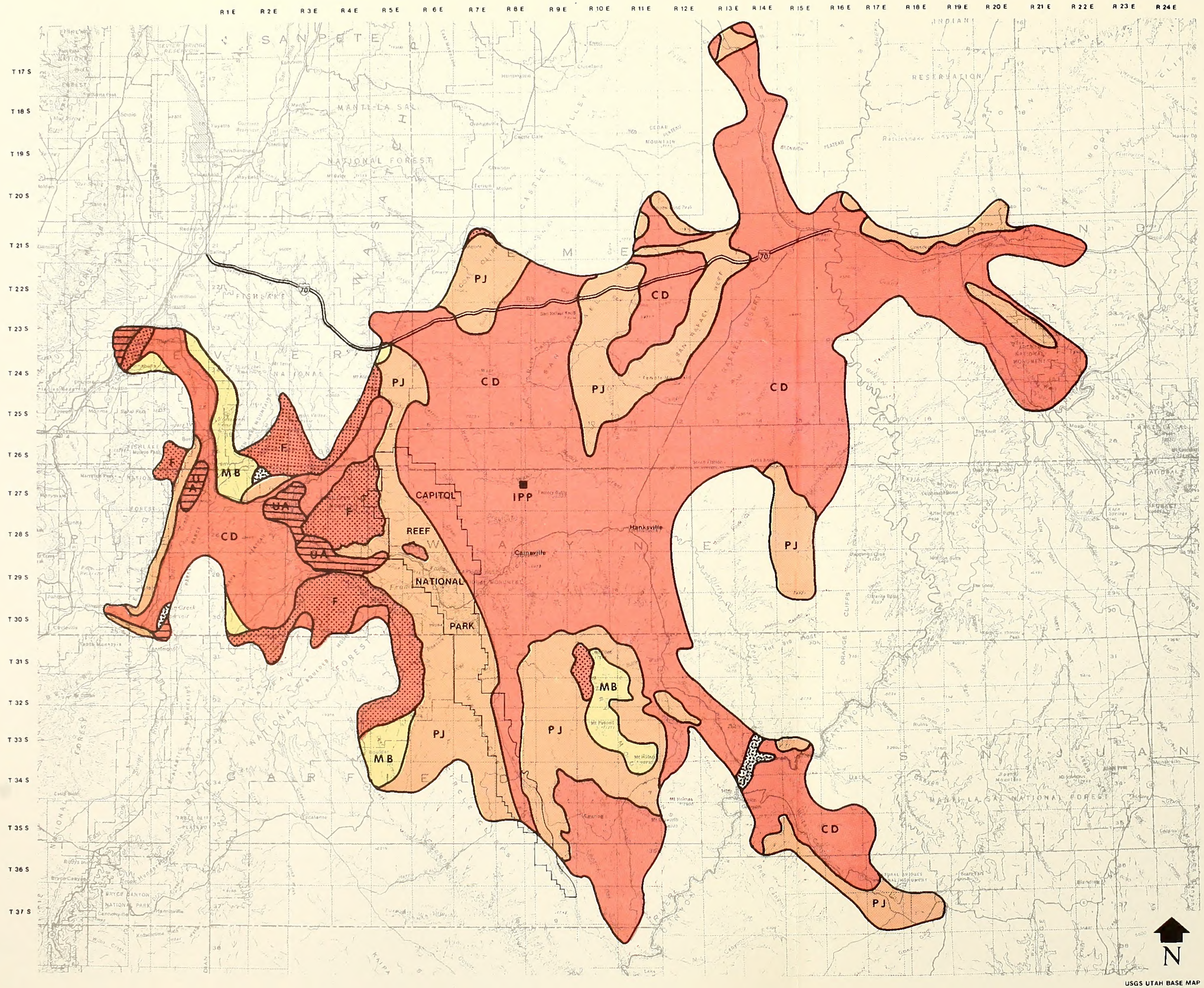
CAINE SPRINGS

FIGURE 2-13

TABLE 2-9

Perennial Streams in the Southern California Transmission System Corridors

Stream	Location
U.M. Creek	Sevier County, Utah
Fremont River	Sevier County, Utah
Otter Creek	Piute County, Utah
East Fork Sevier River	Piute County, Utah
Sevier River	Piute County, Utah
Ash Creek	Washington County, Utah
Quail Creek	Washington County, Utah
Santa Clara River	Washington County, Utah
Meadow Valley Wash	Clark County, Nevada
Muddy Creek	Clark County, Nevada
Steptoe Creek	White Pine County, Nevada
Mojave River	San Bernardo County, Calif.

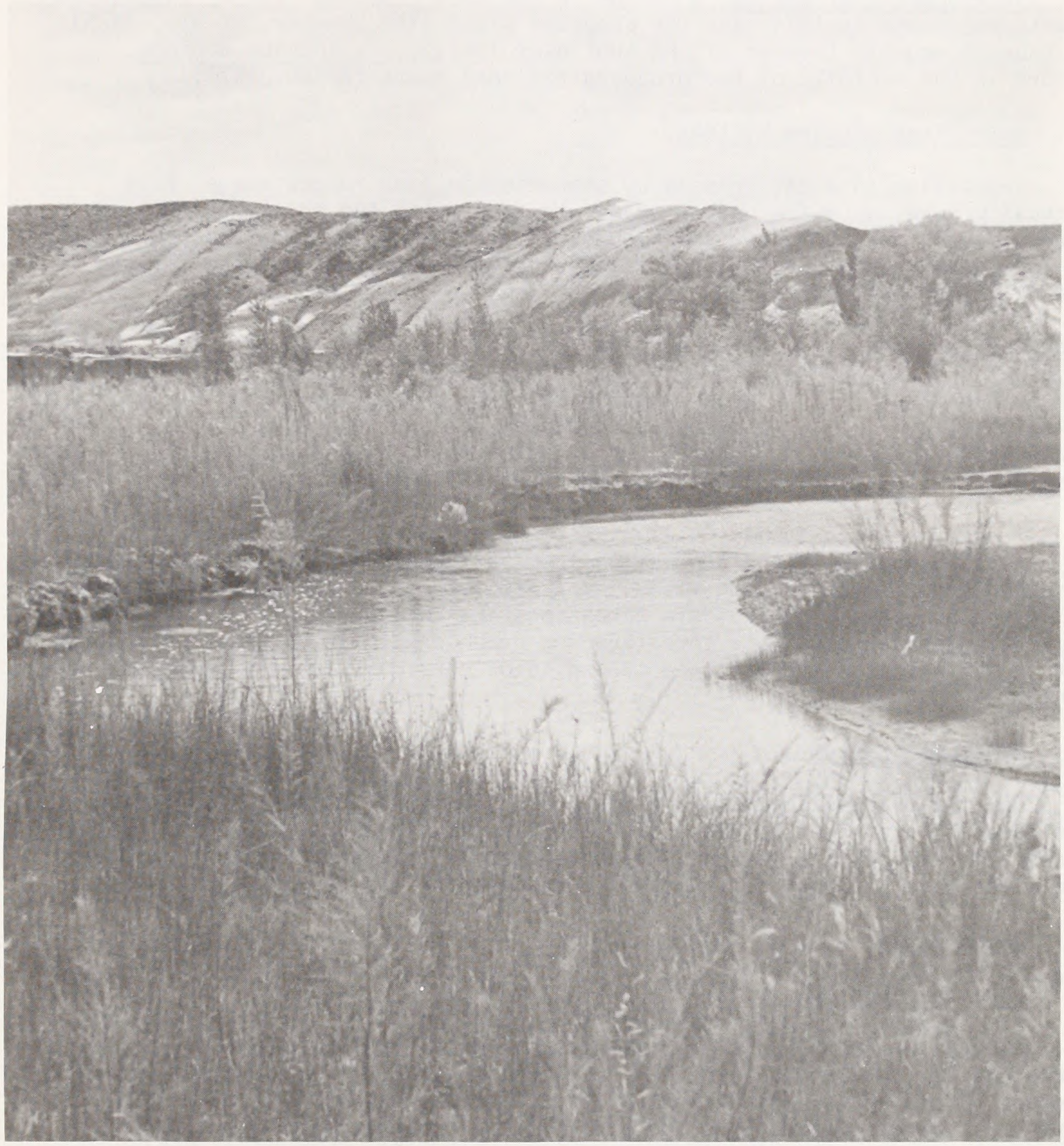


LEGEND

F - Forest	
MB - Mountain Brush	
PJ - Pinyon-juniper	
CD - Cold Desert	
R - Riparian	
UA - Urban, Agricultural	

VEGETATION TYPES WITHIN THE REGIONAL SETTING

FIGURE 2-14



RIPARIAN VEGETATION FREMONT RIVER

FIGURE 2-15

2. Primary Project Area and Coal Haul Railroad

The vegetation within the primary project area is predominantly cold desert type (see Figure 2-14). The vegetation along the proposed railroad route is shown on Figure 2-A.

Sclerocactus wrightiae, a cactus on the 1976 proposed list of endangered plants was found in 1974 near the proposed plant site (Harper, et al., 1975). An unusual endemic (member of the sunflower family), Parthenium alpinum, occurs in the vicinity of the proposed railroad route (Welsh, 1977).

3. Power Transmission Systems

Vegetation in areas crossed by transmission line routes ranges from virtually none, on a few barren areas, to forests in the mountains, but is predominately desert types (see Figures 2-B through 2-M). The proposed route of the Southern California Transmission System crosses Joshua Tree forests in the following locations:

Geographical Area	Line Segment	Mileposts
Beaver Dam Slope	Cedar Wash-Gypsum Jct. (Figure 2-I)	0-45
Delamar Valley	Lincoln Jct.-Gypsum Jct. (Figure 2-D)	30-34
Piute Valley	Eldorado Jct.-Victorville (Line 2)(Figure 2-D)	20-30
Cima Dome	Eldorado Jct.-Victorville (Line 2)(Figure 2-J)	45-65

Available collection information from various herbaria, published and un-published literature, and field inventory records were used to map locations of listed proposed and candidate threatened and endangered plant species.

Proposed and candidate threatened or endangered plant species which occur within 2.5 miles of the proposed transmission corridors are listed in Appendix II-12.

4. Microwave System

The two proposed microwave sites would be within the regional setting. The Moroni Slope site supports cold desert vegetation such as Brigham tea, shadscale, and galleta grass. Forest vegetation occurs at the Elkhorn site. The sites have not been surveyed for threatened or endangered plant species.

G. ANIMAL LIFE

1. Regional Setting

Approximately 455 species of vertebrate wildlife, 354 of which are protected by law, are found within the regional setting. These include 33 fish species (2 protected, endangered; 18 protected, nongame and 13 protected, game), 36 species of reptiles and amphibians (1 protected, nongame and 35 unprotected, nongame), 307 bird species (2 protected, endangered; 258 protected, nongame; and 47 protected, game) and 79 mammal species (66 unprotected, non game; 1 protected, nongame; and 12 protected, game).

(a) Terrestrial Wildlife

Of the 396 species of terrestrial wildlife found in the regional setting, 61 species are game animals. Big game species in the area include elk, mule deer, pronghorn antelope, desert bighorn sheep, bison, mountain lion, and black bear. Figure 2-16 shows big game distribution. Mule deer are the most abundant big game species and the Henry Mountain bison herd (approximately 300 animals) has special significance since it is the only actively hunted herd of free roaming bison in the United States (UDWR, 1977b).

Major upland game species include chukar partridge, ring-neck pheasant, white-wing pheasant, blue and ruffed (forest) grouse, sage grouse, Merriam's turkey, Gambel's quail, mourning dove, band-tailed pigeon, cottontail rabbit, and snowshoe hare. Upland game distributions are shown on Figure 2-17. In desert areas, the distribution of upland game species often centers around water sources.

Waterfowl species such as Canada geese, snow geese, mallard, gadwall, pintail, green-winged teal, redhead, canvasback, and red breasted merganser occur throughout the region. They are primarily migratory in this vicinity. The most important nesting sites for these species are the Fremont River at the Bicknell Bottoms Wildlife Management Area, Otter Creek Reservoir, and the East Fork of the Sevier River (see Figure 2-18).

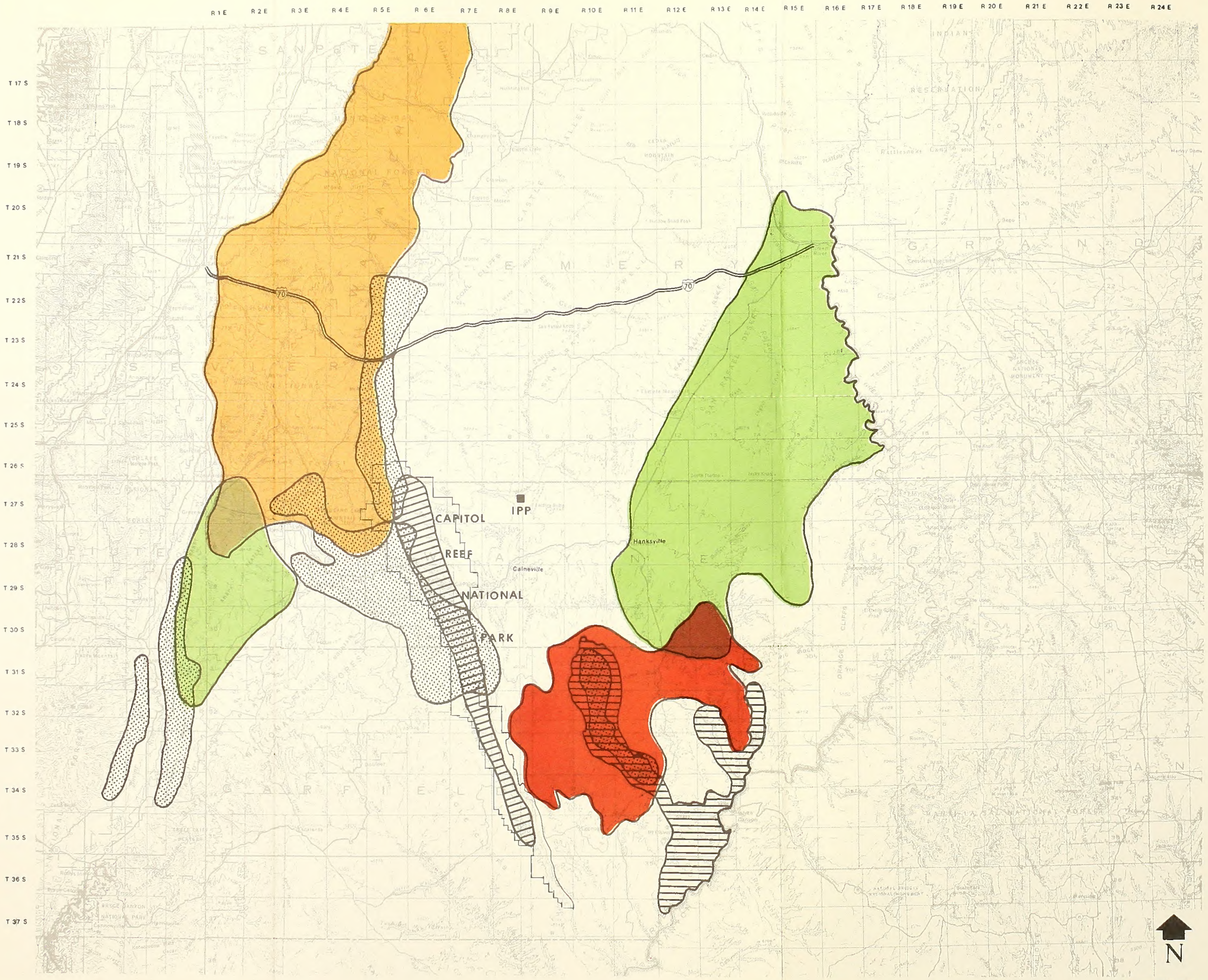
Among non-game species, predatory and fur-bearing mammals are widely distributed throughout the region and include: coyote, fox, bobcat, badgers, skunks, beaver, and muskrat. No areas of concentration have been identified for these species.

The bald eagle (endangered), peregrine falcon (endangered), inhabit the regional setting. The bald eagle is a winter migrant and the peregrine falcon is a wide ranging year long resident (Eyre and Paul, 1973). A black-footed ferret (endangered) sighting has been reported near Woodside, Utah and this species could conceivably be associated with prairie dog towns throughout the region (UDWR, 1977a). The Utah prairie dog (endangered) inhabits the Awapa Plateau west of Loa, Utah and Grass Valley, north of Angle, Utah (see Figure 2-17) (Collier and Spillet, 1975).

Important raptor areas (Figure 2-18) are located near Fishlake and Geyser Peak on the Fishlake National Forest where ospreys are summer residents, and golden eagles live year long. The west side of Parker Mountain is a nesting area for golden eagles (Bowden, 1977).

b. Aquatic Wildlife

Important fisheries within the region include Fish Lake; Johnson, Koosharem, Otter Creek, Forsyth, and Mill Meadow reservoirs; and many small lakes on the Aquarius Plateau, Boulder Mountain, and Thousand Lake Mountain. The most important stream fisheries include the central and upper Fremont River, UM and Seven Mile Creeks, Otter Creek and the Sevier River (see Figure 2-17). These waters support rainbow and brown trout. Some brook and cutthroat trout fishing is available. Fish Lake is one of only a few waters in Central Utah that support lake trout (Sigler and Rush, 1963), and UM and Seven Mile are two of the nine wild trout waters in Utah (UDWR, 1976a). Lake Powell is an important fishery for many warm and cold water species. Two officially listed threatened or endangered fish species, the humpback chub (endangered and Colorado squaw fish (endangered), occur within the regional setting in the Green and Colorado rivers and Lake Powell. Two species proposed as threatened



LEGEND

Elk Distribution

Antelope

Bighorn Sheep [1]

Bison Range

Deer Crucial Range [2]

1. Bighorn Sheep were last seen on the Henry Mtns. several years ago. Capitol Reef is potential habatat.
2. Deer are found throughout the region where water is available.

Note: Cougar and Black Bear are found in small numbers, generally in higher elevations.

10 0 10 20 30 40 Miles

GENERAL REGIONAL DISTRIBUTION OF BIG GAME SPECIES

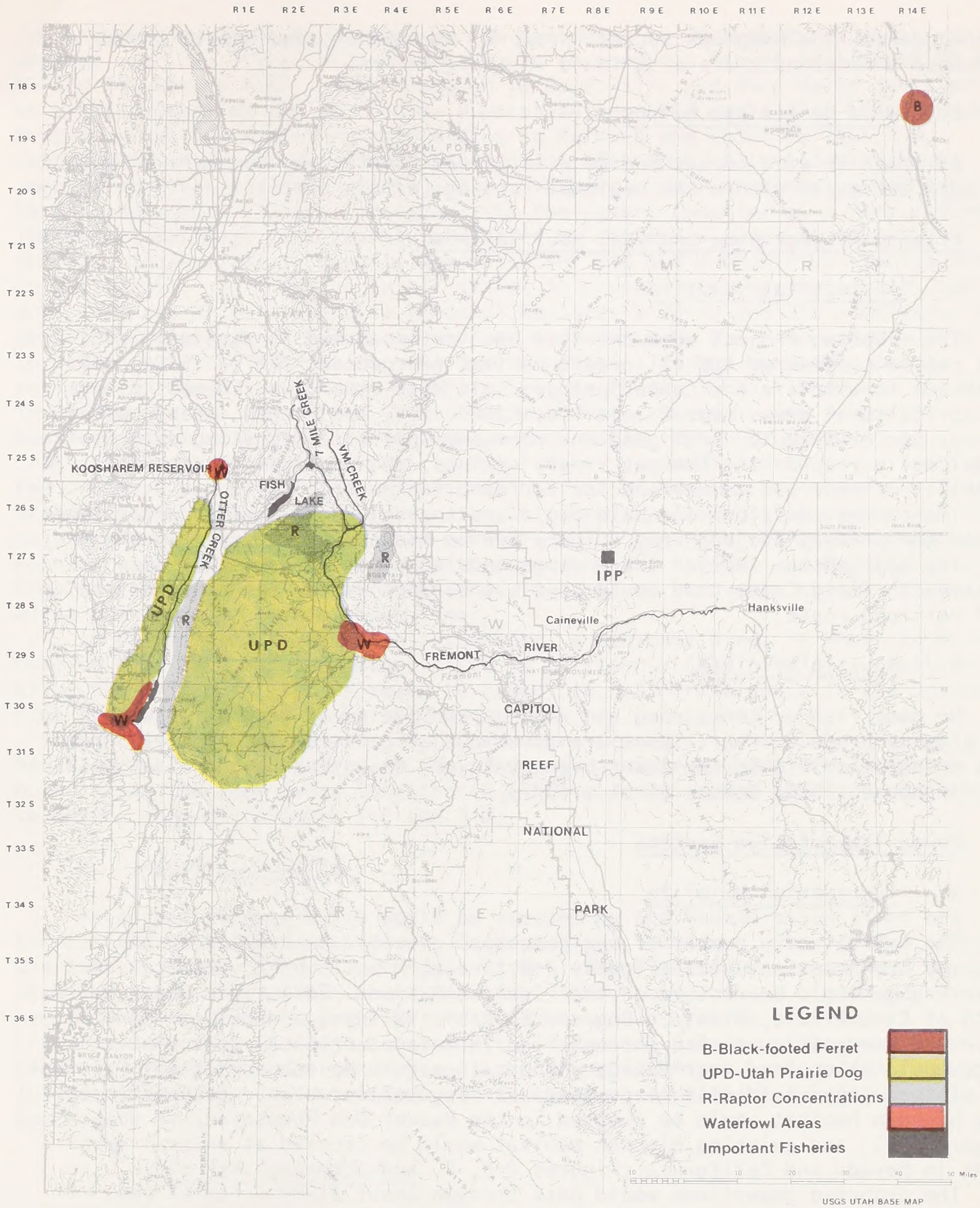
FIGURE 2-16

LEGEND

- P-Pheasant
- C-Chukar
- FG-Forest Grouse
- BP-Band-tailed Pigeon
- T-Turkey
- Q-Quail
- S-Sage Grouse

GENERAL DISTRIBUTION OF IMPORTANT UPLAND GAME SPECIES IN THE REGION

FIGURE 2-17



THREATENED AND ENDANGERED SPECIES, RAPTOR CONCENTRATIONS, WATERFOWL AND FISHERIES IN THE REGION

FIGURE 2-18

or endangered, the humpback sucker (proposed threatened) and bonytail chub (proposed endangered), are also found in these waters.

c. Wild Horses and Burros

At least 49 wild horses and 24 wild burros inhabit the San Rafael Swell and adjacent areas within the regional setting (Wilson, 1976).

2. Primary Project Area and Coal Haul Railroad

a. Terrestrial Wildlife

The proposed project area and coal haul railroad are located mainly on what can be considered typical desert habitat (Jorgensen, 1977). Sites most important to wildlife are Caine Springs, Salt Wash, the lower Fremont River, and agricultural areas near Caineville, Hanksville, and Ferron, Utah. Water sources are utilized by both game and non-game species. Migrating waterfowl occasionally stop on the Fremont River, springs, and available stock ponds. A checklist of observed animal species is found in Appendix II-13.

The peregrine falcon and bald eagle are the only endangered species found within the primary project area. There are no known nesting sites in the vicinity (Jorgensen, 1977). The endangered black-footed ferret has been observed in Emery County and could possibly be found along the proposed coal haul railroad route.

b. Aquatic Wildlife

No game fish or threatened and endangered species of fish exist within the primary project area. There are no unique or rare species of micro-organisms or aquatic life in the lower Fremont River, Caine Springs, or Salt Wash (Westinghouse, 1976; McAda, et al., 1977).

3. Power Transmission Systems

a. Terrestrial Wildlife

The habitat of a number of big game species would be crossed by the proposed transmission lines (Figures 2-B through M). In Utah, critical deer winter range would be crossed on the Fishlake National Forest; in Grass Valley, south of Circleville, Utah; in Dog and Buckskin Valleys; and between Kanarraville and Leeds (Figures 2-B through D). In Nevada, critical deer winter range would be crossed near Mahogany Mountain and in Muleshoe Valley. Critical elk winter range would also be crossed near Dog Valley, Utah. Potential year long bighorn habitat would be crossed in the Beaver Dam Mountains, in Utah (Figure 2-D), and existing bighorn habitat would be crossed at several locations in Nevada and California (Figures 2-E, F, and H through K).

The proposed powerlines would pass through about 3,500 acres of sage grouse habitat in Forsyth Valley on the Fishlake National Forest (USFS, 1977), and about 15,000 acres of nesting and brooding areas in Dog Valley, west of Circleville, Utah (Figure 2-B). The route would cross directly across a known sage grouse strutting ground in this area (BLM, 1977a).

Threatened and endangered species which may occur along the proposed routes are the bald eagle (endangered), the American peregrine falcon (endangered), and the Utah prairie dog (endangered). Concentration areas for winter-

ing bald eagles would be crossed by the Salt Wash to Jack Henry Junction segment near the Otter Creek Reservoir and in Kingston Canyon (mileposts 55 to 65 and 68, Figure 2-B). The Paragonah to Bald Hills and Jack Henry Junction to Lincoln Junction and St. George substation segments would also cross concentration areas for wintering bald eagles in Parowan and Cedar Valleys. A complete inventory of roosting sites has not been done, but at least three identified sites would be within 1/4 to 1/2 mile of the proposed routes in Parowan and Cedar Valleys. Nevada lists the desert tortoise as a rare species. The desert tortoise is currently protected by state law in Utah, Nevada, Arizona, and California, and is nominated for the BLM's sensitive species list in California. It's status in all states is presently being reviewed by the U.S. Fish and Wildlife Service (Federal Register 8-23-7) and the population of desert tortoises in Utah is proposed for endangered by the Fish and Wildlife Service. Critical habitat for the desert tortoise is not currently being reviewed by the U.S. Fish and Wildlife Service (Dodd, 1979). However, the BLM in California has identified areas that would be crossed by the proposed Southern California Transmission System that would likely be proposed as critical desert tortoise habitat in the future. In addition to these species, the proposed route would cross historic habitat of two species which the State of California recognizes as rare: the California yellow-billed cuckoo and the Mojave ground squirrel. The gila monster, which may occur along the proposed corridor, is a unique and uncommon species in Utah, Nevada, and California. Figures 2-B through 2-M show threatened, endangered, and rare species habitat along the proposed transmission lines.

In California, the Bendire's thrasher, a non-game bird, is known to breed only on Cima Dome and four other sites in California (BLM, 1977d). Additionally, the gilded flicker is known to breed, in California, only in the Joshua tree area of Cima Dome (BLM, 1977d).

Raptors are distributed along the entire transmission system. Ferruginous hawks, which are ground nestors (in pinyon-juniper areas) are widely distributed along the Jack Henry Junction to Lincoln Junction and Lincoln Junction to Gonder segments (Figure 2-C and 2-M).

b. Aquatic Wildlife

Principal streams which would be crossed by the transmission lines are the East Fork of the Sevier River, Fremont River, UM Creek, Otter Creek, Santa Clara River, Muddy River, and Mojave River. The first five streams are in Utah and support game fish where the power lines would cross. The Muddy River near Glendale, Nevada and the Mojave River near Victorville, California (Figures 2-F and 2-J) are habitat for the following rare or endangered fish species: the Moapa dace (endangered) and the White River spring fish (rare) in the Muddy River; and the unarmored threespine stickleback (endangered) in the Mojave River.

c. Wild Horses and Burros

Approximately 213 wild horses and 365 burros graze along the proposed power transmission routes. The locations of their ranges are shown on Figures 2-B to 2-M. Generally the wild horses are found in western Utah and eastern Nevada while the burros range mainly in the Mojave Desert of eastern California.

H. CULTURAL RESOURCES

1. Regional Setting

As of 1977, 821 archaeological sites had been recorded within the regional setting (Dickey, 1977). This includes approximately 45 individual cultural properties included in or eligible for nomination to the National Register of Historic Places. Also being considered for nomination to the National Register is an archaeological district made up of the sites in the Grand Gulch area of San Juan County, Utah.

These sites represent five prehistoric cultural traditions:

1) Paleo-Indian (ca. 12,000 B.C. to 7,000 B.C.)

2) Desert Archaic (ca. 7,000 B.C. to A.D. 400)

3) Fremont (San Rafael and Sevier variants, ca. A.D. 700 to 1200 and A.D. 780 to 1210 respectively)

4) Virgin-Kayenta Anasazi (ca. ? to A.D. 1250)

5) Southern Paiute (ca. A.D. 1200 to Euro-American contact).

Historic activities represented in the area include ranching, homesteading, coal mining, and enterprises associated with railroad construction.

2. Primary Project Area and Coal Haul Railroad

Known cultural values within the primary project area include 28 prehistoric sites and one historic site. None of these meet National Register eligibility criteria.

The proposed route of the coal-haul railroad traverses the Desert Archaic, San Rafael Fremont, and Paiute cultural areas. Thirteen sites have been recorded within the right-of-way, four of which are eligible for inclusion in the National Register. These four sites are Fremont villages or habitation sites.

3. Power Transmission Systems

a. Southern California Transmission System

The proposed transmission system route traverses cultural areas which include the Paleo-Indian, Desert Archaic, Virgin-Kayenta Anasaze, Fremont (San Rafael, Sevier, and Parowan variants), Southern Paiute, Shoshonean groups, Chemehuevis, and Vanyumes. An early stage of cultural development is being investigated in areas of the California Desert that would be crossed by this proposed route.

Based on a sample inventory, 274 prehistoric and historic sites were recorded along the proposed transmission line routes (Brooks and Larson, 1975; Fowler, et al., 1978a; Nielson, 1976). Sixty-three of these sites are included in or meet the criteria for inclusion in the National Register of Historic Places. Figure 2-B through 2-M show the approximate locations of these sites.

b. Utah Transmission System

The proposed transmission system route traverses cultural areas which include the Paleo-Indian, Desert Archaic, Fremont (Sevier, Parowan, and San Rafael variants), Southern Paiute, and Northern Ute.

Based on a sample inventory, 176 prehistoric and historic sites were recorded along the proposed transmission line routes (Fowler, et al., 1978a; Nielson, 1976). Twenty-five of these sites are included in or meet the criteria for inclusion in the National Register of Historic Places. Figures 2-B, C, H, L, and M show the approximate locations of the sites.

The transmission lines would not be visible from any sites currently listed on the National Register of Historic Places (National Register listings as of April, 1979).

I. RECREATION AND AESTHETICS

1. Regional Setting

a. Recreation

Major recreation attractions are listed on Table 2-10. These include the seven reservoirs or lakes shown on Figure 2-19 which provide water-based recreation.

Municipal recreation facilities are listed on Table 2-11. There are none in the Hanksville-Caineville area. Minimal municipal recreation standards (numbers of recreational facilities per person) (BOR, 1967), are not currently met throughout the regional setting. Other developed recreation sites (camping and picnicking) and their visitor use are listed on Table 2-12 and their locations are shown on Figure 2-20.

Dispersed recreational activities that occur in the region include hunting for elk, deer, antelope, upland game, and waterfowl, fishing, rockhounding, sightseeing, horseback riding, backpacking, hiking, water based activities, off-road vehicle use, camping, and picnicking. Because of the low population density and significant amount of federal land, most of the region is available for dispersed recreational use.

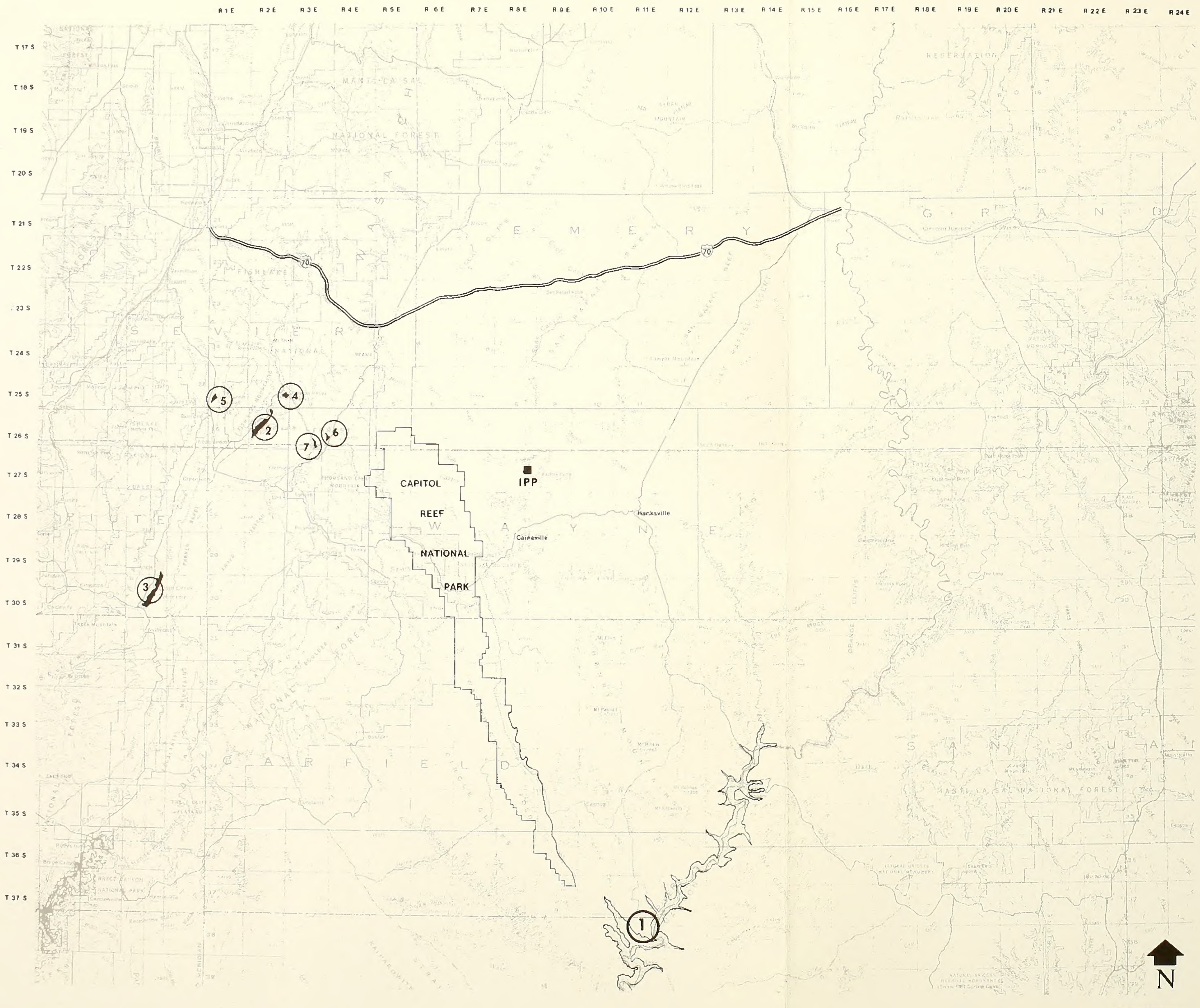
b. Aesthetics

The region's scenic character is one of vast open-space and dramatic variation in landform, vegetation, and color. The landscape includes a variety of sparsely vegetated deserts, heavily forested mountains, mesas, buttes, ruggedly dissected badlands, and extremely colorful, unusual canyons and rock formations carved from rivers that drain the region's interior. The regional setting includes such high quality scenic areas as Capitol Reef National Park, Canyonlands National Park, Arches National Park, Dixie National Forest, Fishlake National Forest, the San Rafael Swell, Natural Bridges National Monument, Goblin Valley State Park, and Glen Canyon National Recreation Area. The BLM proposed Hondu Primitive Area on the San Rafael Swell borders the primary project area and is within 5 miles of the proposed plant site.

TABLE 2-10

Major Recreation Attractions

Administering Agency	Major Attractions
U.S. Forest Service	Fish Lake Fremont River Johnson Valley Reservoir Thousand Lake Mountain Boulder Mountains Mill Meadow Reservoir Forsyth Reservoir
National Park Service	Capitol Reef National Park Canyonlands National Park Arches National Park Natural Bridges National Monument Glen Canyon National Recreation Area
Bureau of Land Management	Henry Mountains San Rafael Swell Robbers Roost San Rafael River Koosharem Reservoir Sego Canyon Petroglyphs Otter Creek Reservoir Henry Mountain National Natural Landmark
State of Utah	Goblin Valley State Reserve Green River State Recreation Area Otter Creek Reservoir State Beach



LEGEND

1. Lake Powell
2. Fish Lake
3. Otter Creek Reservoir
4. Johnson Valley Reservoir
5. Koosharem Reservoir
6. Forsyth Reservoir
7. Mill Meadow Reservoir

LAKES AND RESERVOIRS WITHIN THE REGIONAL SETTING

FIGURE 2-19

TABLE 2-11

Municipal and County Outdoor Recreation Facilities

Facility	Richfield Area	Loa Area	Green River Area	Fremont Area	Lyman Area	Bicknell Area
Golf Courses (9 holes)	1	0	0	0	0	0
Ball Parks	1	0	0	0	1	0
Tennis Courts	4	0	2	0	0	2
Swimming Pools	1[a]	0	0	0	0	0
Fairgrounds	1	0	0	0	0	0
Rodeo grounds	1	1	0	0	0	0
Neighborhood Park acreage[b]	7.25[a]	1.25	unknown	unknown	unknown	0

[a]Facilities which are presently overcrowded.

[b]Includes school ground acreage available for recreation.

TABLE 2-12

Recreation Use on Existing Developed Sites

Map No.[a]	Site	Length of Season[b]	Visitors[c]	Visitor Days[d]	Percent of Theoretical Capacity
United States Forest Service					
1	Elkhorn Campground	77	na	3,000	25
2	Frying Pan Campground	137	na	3,800	25
3	Bowery Campground	137	na	27,100	46
4	Mackinaw Campground	137	na	36,000	49
5	Doctor Creek Campground	137	na	12,300	30
6	Fremont River Complex	152	na	18,700	31
7	Single Tree Campground	135	na	6,300	12
8	Pleasant Creek Campground	135	na	11,400	44
9	Oak Creek Campground	135	na	5,800	43
10	Bowery Picnic Area	137	na	700	5
11	Sunglow Picnic Area	185	na	2,200	21
12	Doctor Creek Picnic Area	152	na	4,700	21
13	Twin Creeks Visitor Center	107	na	500	20
Bureau of Land Management					
14	Starr Springs Campground	240	na	8,100	23
15	Hog Springs Picnic Area	365	na	1,100	10
16	Lonesome Beaver Campground	120	na	400	2
17	McMillan Campground	120	na	200	3
18	San Rafael Campground	210	na	5,000	24
National Park Service					
19	Capitol Reef Campground	365	na	35,600	18
20	Capitol Reef Picnic Area	365	na	8,500	23
21	Bullfrog Campground	365	na	na	na
22	Devil's Garden Campground	365	na	na	na
23	Devil's Garden Picnic Area	365	na	na	na
24	Squaw Flat Campground	365	na	na	na
25	Grandview Point Picnic Area	365	na	na	na
26	Upheaval Dome Picnic Area	365	na	na	na
27	Natural Bridges Campground	365	na	na	na
28	Natural Bridges Picnic Area	365	na	na	na
State of Utah					
29	Goblin Valley State Reserve				na
30	Green River State Recreation Area				na
31	Otter Creek Lake State Beach				na

Source: U.S. Forest Service, Bureau of Land Management, National Park Service, and State of Utah 1976-77 Recreation Use Reports.

[a]Numbers refer to sites on Figure 2-20.

[b]Number of days a year a site can be used.

[c]Indicates the number of visitors for 1976-77.

[d]Recreation use reported in visitor days (A visitor day consists of 12 visitor hours which may be aggregated by one or more person).

na--Data not available or not applicable.

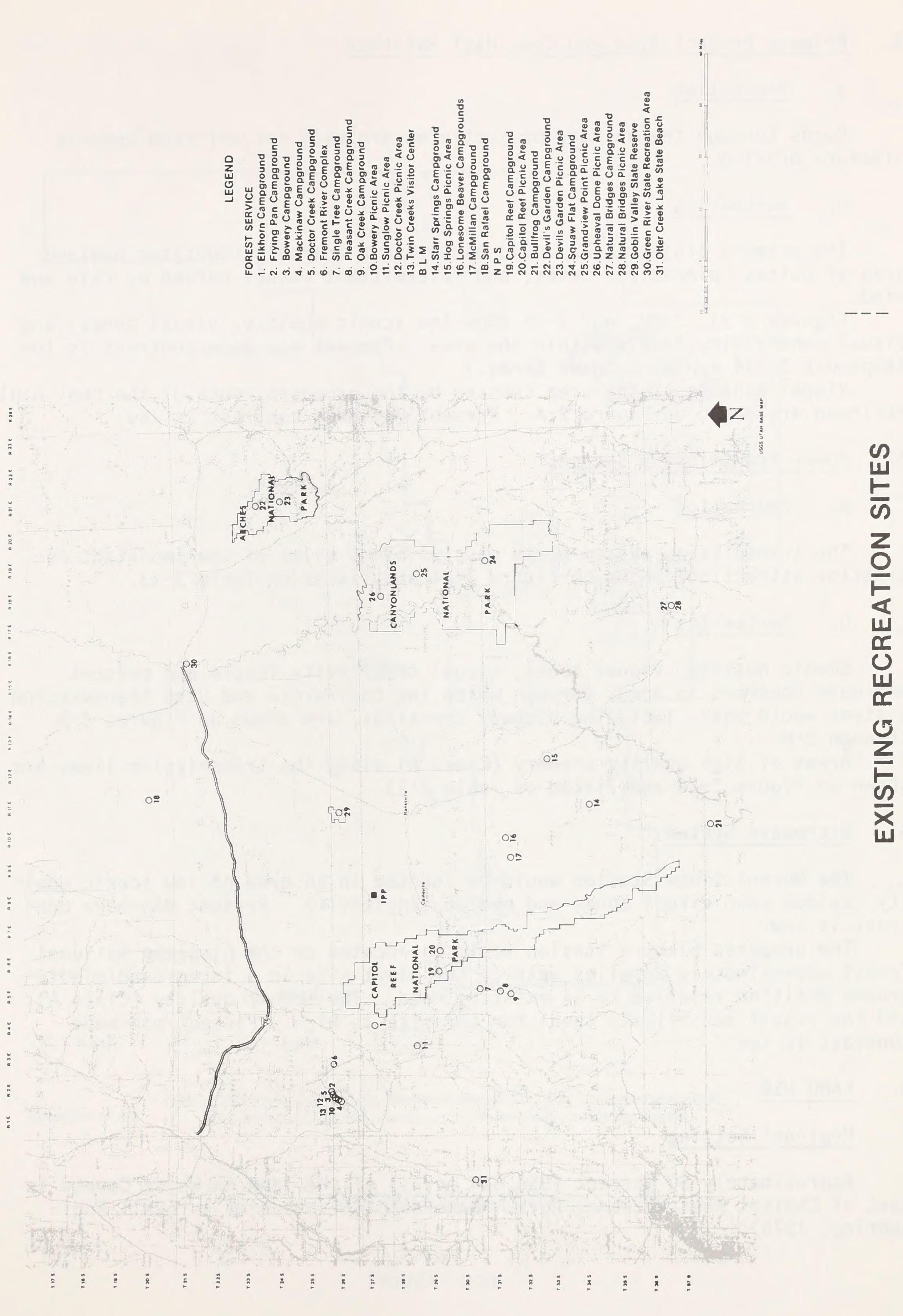

EXISTING RECREATION SITES
LEGEND
FOREST SERVICE
1. Elkhorn Campground
2. Frying Pan Campground
3. Bowery Campground
4. Mackinaw Campground
5. Doctor Creek Campground
6. Fremont River Complex
7. Single Tree Campground
8. Pleasant Creek Campground
9. Oak Creek Campground
10. Bowery Picnic Area
11. Sunglow Picnic Area
12. Doctor Creek Picnic Area
13. Twin Creeks Visitor Center
B L M
14. Starr Springs Campground
15. Hog Springs Picnic Area
16. Lonesome Beaver Campgrounds
17. McMillan Campground
18. San Rafael Campground
N P S
19. Capitol Reef Campground
20. Capitol Reef Picnic Area
21. Bullfrog Campground
22. Devil's Garden Campground
23. Devils Garden Picnic Area
24. Squaw Flat Campground
25. Grandview Point Picnic Area
26. Upheaval Dome Picnic Area
27. Natural Bridges Campground
28. Natural Bridges Picnic Area
29. Goblin Valley State Reserve
30. Green River State Recreation Area
31. Otter Creek Lake State Beach
ARCHES NATIONAL PARK
CANYONLANDS NATIONAL PARK
CAPITOL REEF NATIONAL PARK
IPP
N
USGS UTAH BASE MAP

FIGURE 2-20

2. Primary Project Area and Coal Haul Railroad

a. Recreation

Roads through the primary project area are used for off-road vehicle pleasure driving.

b. Aesthetics

The primary project area would be within a sparsely vegetated badland area of buttes, pinnacles, mesas, and intermittant washes carved by rain and wind.

Figures 2-21, 2-22, and 2-23 show the scenic quality, visual zones, and visual sensitivity levels within the area. Present man-made contrast is low. (Appendix II-14 explains these terms.)

Visual aspects of the area crossed by the proposed route of the coal haul railroad are shown on Figure 2-A. Present man-made contrast is low.

3. Power Transmission Systems

a. Recreation

The transmission system would pass within 5 miles of the important recreation attractions shown on Figure 2-24 and listed on Table 2-13.

b. Aesthetics

Scenic quality, visual zones, visual sensitivity levels and present man-made contrast in areas through which the California and Utah transmission systems would pass, including highway crossings, are shown on Figures 2-B through 2-M.

Areas of high quality scenery (Class A) along the transmission lines are shown on Figure 2-24 and listed on Table 2-13.

4. Microwave System

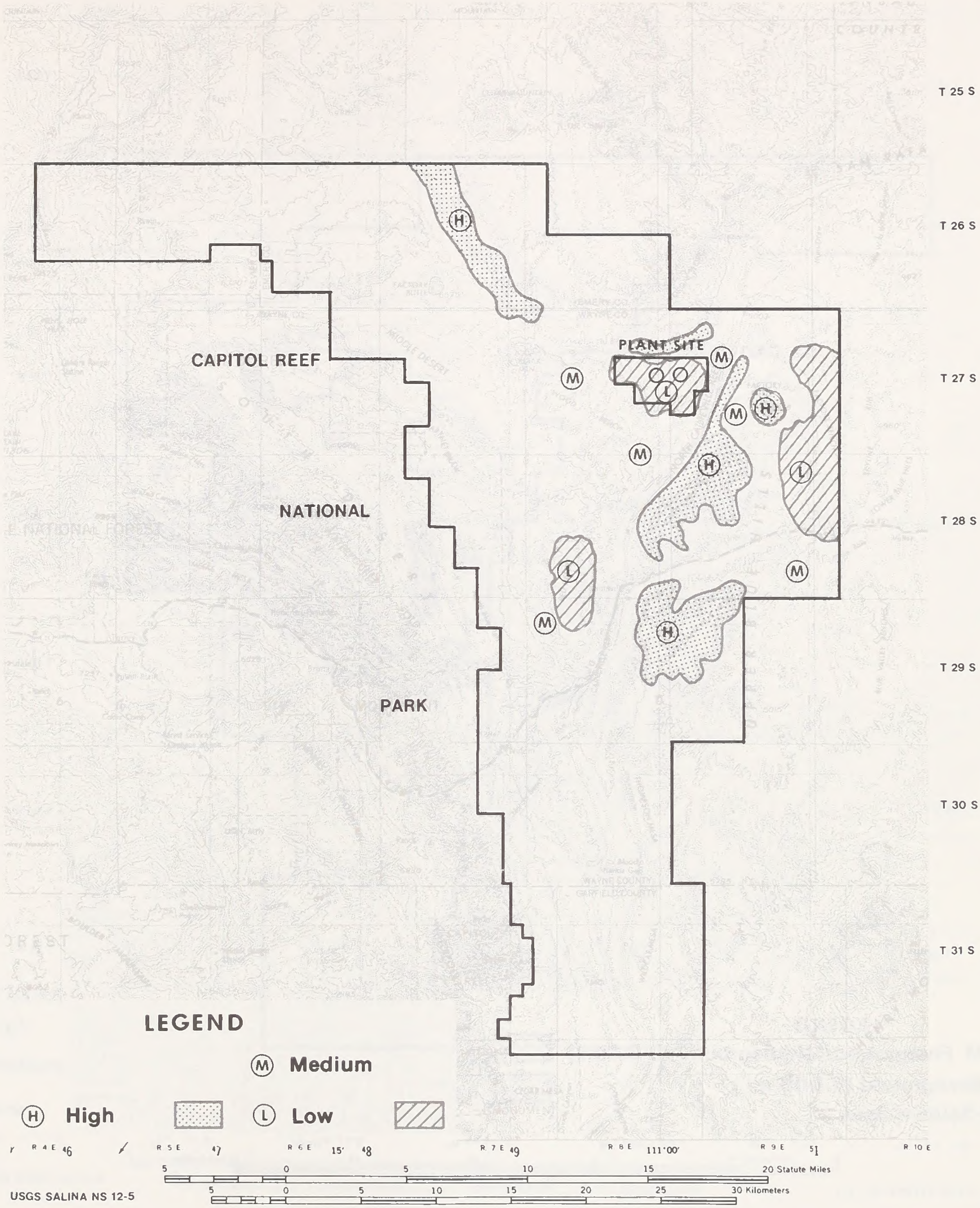
The Moroni Slope Station would be located in an area of low scenic quality, seldom seen visual zone, and medium sensitivity. Present man-made contrast is low.

The proposed Elkhorn station would be located on the Fishlake National Forest approximately 26 miles west of the plant site in a foreground/middleground position relative to an existing road. The scenic quality (Class A) and the visual sensitivity level for the site is high. Present man-made contrast is low.

J. LAND USE

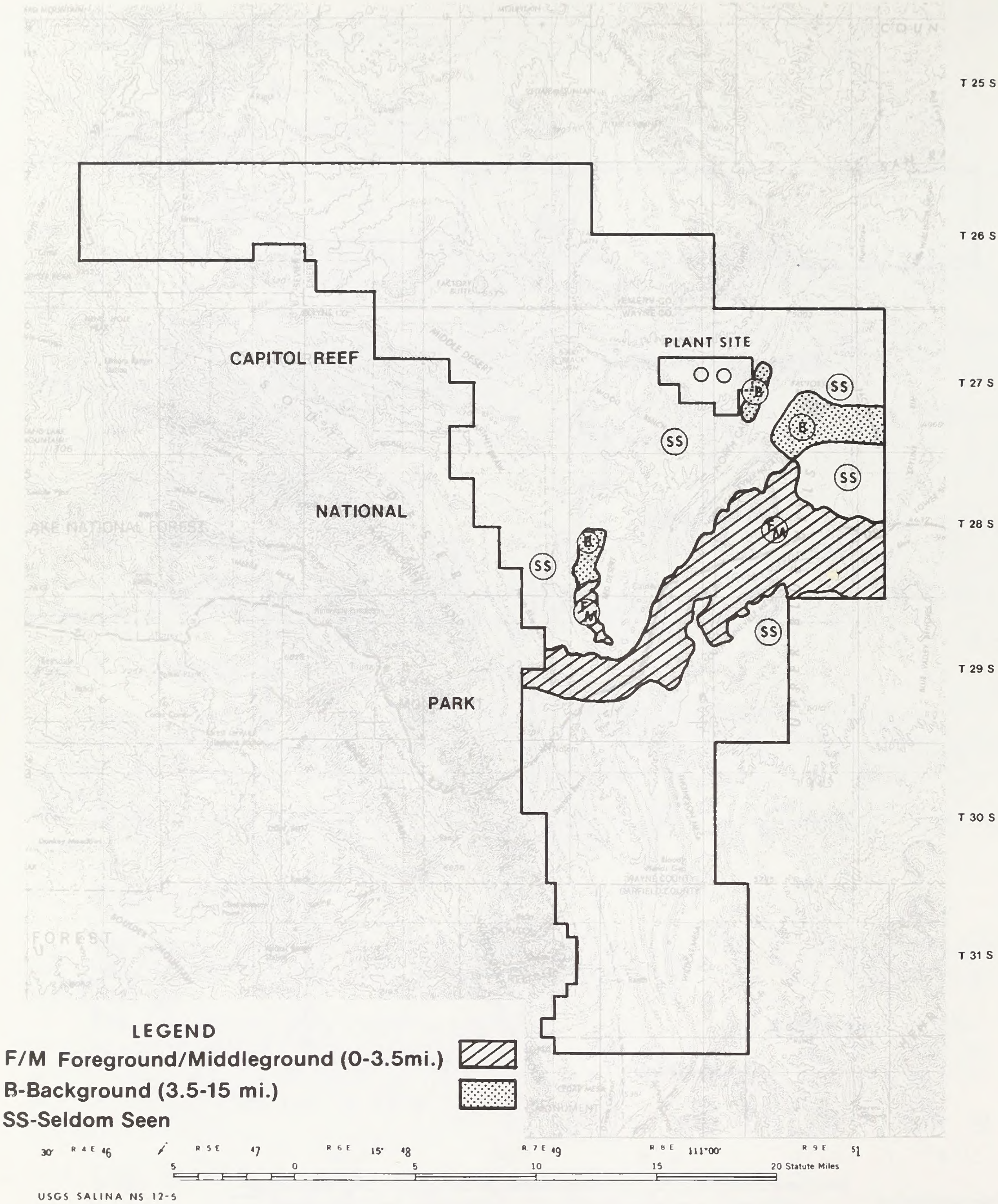
1. Regional Setting

Approximately 60 percent (954,624 acres) of the land in Wayne County is east of Capitol Reef National Park. Ownership in this area is (Call Engineering, 1976):



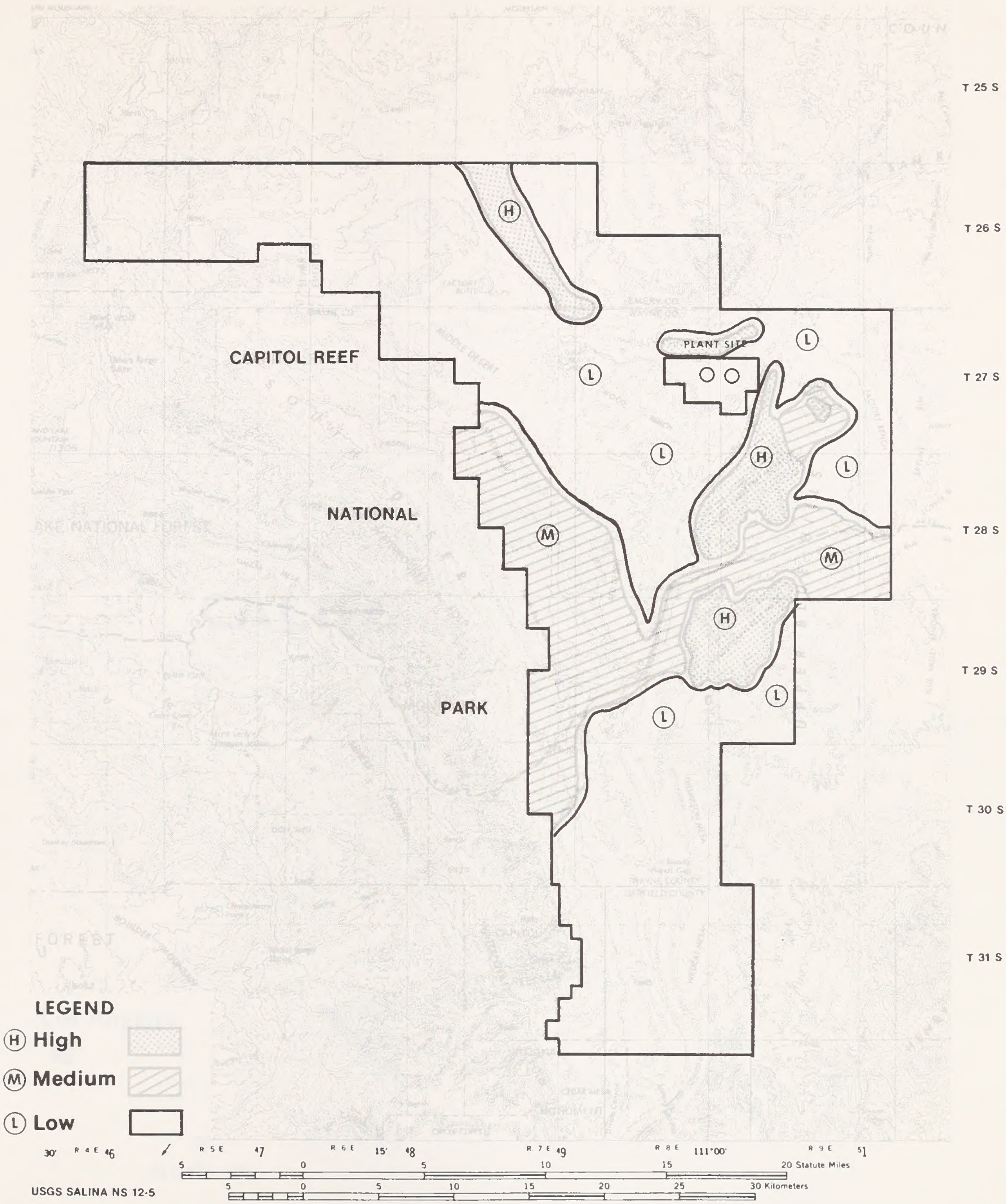
SCENIC QUALITY

FIGURE 2-21



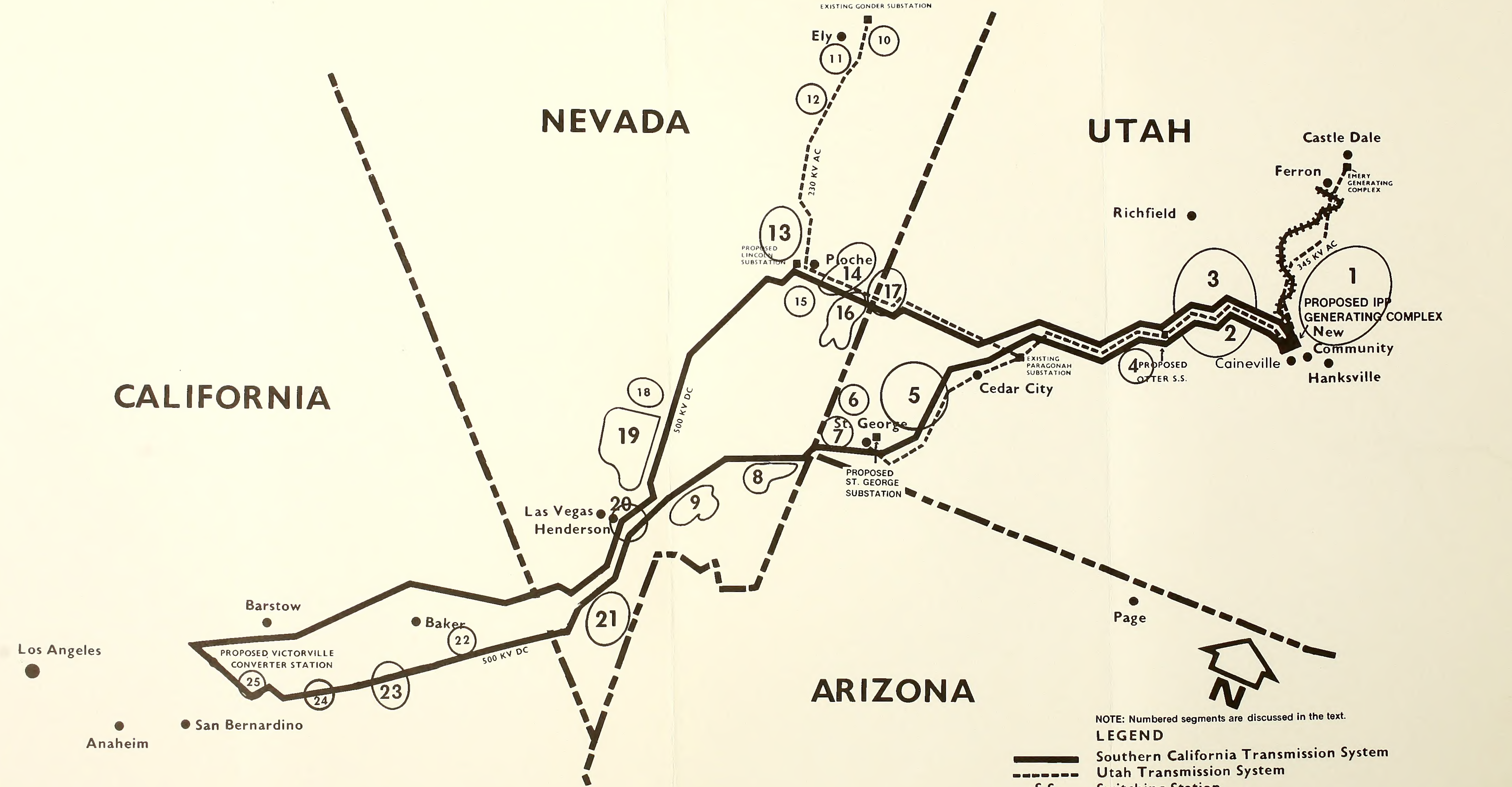
VISUAL ZONES

FIGURE 2-22



VISUAL SENSITIVITY LEVELS

FIGURE 2-23



RECREATION ATTRACTIONS
AND AREAS OF HIGH SCENIC QUALITY
ALONG THE PROPOSED
POWER TRANSMISSION SYSTEM

FIGURE 2-24

TABLE 2-13

Recreation Attractions and Areas of High Scenic Quality Along the Proposed Power Transmission Systems

Map Reference Number	Name of Attraction	Line Segment	Position of Route Relative to Recreation Attraction
1.	Hondu Proposed Primitive Area[a]	Salt Wash to Emery	Proximate
2.	Fremont River Complex[a]	Salt Wash to Jack Henry	Crosses area
3.	Thousand Lake Mountain[a]	Salt Wash to Jack Henry	Crosses area
4.	Otter Creek Reservoir	Salt Wash to Jack Henry	Proximate
5.	Pine Valley Mountain Foothills (includes a scenic overlook and Red Cliffs Recreation Area)[a]	Jack Henry to Cedar Wash	Crosses area
6.	Joshua Tree Natural Area[a]	Cedar Wash to Gypsum Junction	Proximate
7.	Red Mountain[a]	Jack Henry to Cedar Wash	Proximate
8.	Virgin River Recreation Lands[a]	Cedar Wash to Gypsum Junction	Proximate
9.	Muddy Mountains[a]	Cedar Wash to Gypsum Junction	Proximate
10.	Cave Lake State Park	Lincoln to Gonder	Proximate
11.	Commins Lake	Lincoln to Gonder	Proximate
12.	Ward Charcoal Ovens State Park	Lincoln to Gonder	Proximate
13.	Highland Mountains[a]	Lincoln to Gonder	Proximate
14.	Echo Canyon State Recreation Area[a]	Jack Henry to Lincoln	Proximate
15.	Cathedral Gorge State Park[a]	Jack Henry to Lincoln	Proximate

TABLE 2-13 (concluded)

Map Reference Number	Name of Attraction	Line Segment	Position of Route Relative to Recreation Attraction
16.	Panaca Charcoal Kilns[a]	Jack Henry to Lincoln	Crosses area
17.	Mahogany Mountain	Jack Henry to Lincoln	Crosses area
18.	Pahranagat National Wildlife Refuge[a]	Lincoln to Gypsum	Proximate
19.	Desert National Wildlife Refuge[a]	Lincoln to Gypsum	Proximate
20.	Sunrise Mountain[a]	Lincoln to Gypsum	Crosses through
21.	Lake Mead National Recreation Area[a]	Gypsum to Victorville Line 2	Proximate
22.	Cima Dome[a]	Eldorado to Victorville Line 2	Crosses through
23.	Devils Playground[a]	Eldorado to Victorville Line 2	Crosses through
24.	Pisgah Crator[a]	Eldorado to Victorville Line 2	Crosses through
25.	Sidewinder	Eldorado to Victorville Line 2	Crosses through

[a]Area of high quality (Class A) scenery.

	Federal	State	Unincorporated Towns	Other Private	Total
Acres	851,264	92,960	6,000	4,400	954,624
Percent	89%	10%	.7%	.3%	100%

Land use categories, by acres, in Wayne County east of Capitol Reef National Park are:

	Open Range	Forest	Urban	Agricultural	Waste/barren	Total
Acres	629,423	100	85	1,174	232,842	954,624
Percent	66%	.01%	.01%	.01%	34%	100%

Acreages of irrigated land are Hanksville--440 acres, Caineville--434 acres, Notom--300 acres (Fremont River Study, 1975).

The Soil Conservation Service has not completed an inventory of prime and unique farmlands in Wayne County, Appendix II-15 defines prime and unique farmlands.

There are no designated wilderness or primitive areas within the regional setting. Link Flat (BLM) is the only designated natural area. United States Forest Service (USFS) administered lands have been evaluated for wilderness values in the Roadless Area Review and Evaluation II (RARE II). The RARE II Final Environmental Statement (FES) recommends two areas within the regional setting for wilderness designation. The FES recommends all other RARE II areas in the regional setting as non-wilderness. Portions of four National Park Service Wilderness Proposals are within the regional setting. Wilderness review of BLM administered lands in the regional setting has officially begun, but results will not be available for this environmental statement. Appendix II-16 describes the BLM wilderness review process. Nine areas, however, have been identified through management planning as having potential for special designation (i.e., Wilderness, Primitive, or Wild and Scenic River). These areas will be protected until further studies and final determinations are made. Table 2-14 lists the areas with potential for wilderness or other special designation and Figure 2-25 shows their locations, but boundaries are not definite.

The major highway through Wayne County is Utah Highway 24. It was reclassified from a secondary to a primary highway route in 1976. Approximately 15 miles of U-24 is located within Capitol Reef National Park. The design speed for most of this 15-mile section of winding, narrow 2-lane, scenic highway is 45 miles per hour.

The 1975 Traffic Volume Map prepared by the Utah Department of Transportation shows an average daily traffic (ADT) count of 320 vehicles per day on Utah Highway 24 just east of Capitol Reef National Park. This traffic count includes a mid-range percentage of 15 percent (48 ADT) out-of-state vehicles and 10 percent (32 ADT) heavy trucks. Summer traffic through the park area is mostly tourist traffic.

TABLE 2-14

Areas With Potential for Wilderness or Other Special Designation

Location[a]	Name	Major Value	Decision Document Reference and Date
1.	Fishlake Mountain (4-307)[b]	Wilderness	RARE II Final Environmental Statement, January, 1979
2.	Woodenshoe-Dark Canyon (4-436)	Wilderness	RARE II Final Environmental Statement, January, 1979
3.	Capitol Reef National Park (NP-906)	Wilderness	Capitol Reef National Park Wilderness Proposal, 1974
4.	Arches National Park (NP-900)	Wilderness	Arches National Park Wilderness Proposal, 1974
5.	Canyonlands National Park (NP-905)	Wilderness	Canyonlands National Park Wilderness Proposal, 1974
6.	Glen Canyon National Recreation Area	Wilderness	Glen Canyon National Park Wilderness Proposal, 1976
7.	Dirty Devil River	Wild and Scenic River and Wilderness[c]	Henry Mtn. P.U., 1975 BLM Washington Office Memorandum
8.	Robbers Roost	Primitive and Wilderness	Robbers Roost P.U., 1969
9.	Little Rockies	Primitive and Wilderness	Henry Mtn P.U., 1975
10.	Hondu (Part of Link Flat continguous roadless area)	Primitive and Wilderness	Last Chance P.U., 1975
11.	San Rafael Reef	Primitive and Wilderness	San Rafael Planning Unit Resource Analysis
12.	Sids Mountain	Primitive and Wilderness	San Rafael Planning Unit Resource Analysis
13.	Mexican Mountain	Primitive and Wilderness	San Rafael Planning Unit Resource Analysis
14.	San Rafael River	Wild and Scenic River	San Rafael Planning Unit Resource Analysis
15.	Muddy Creek	Wild and Scenic River	Last Chance P.U., 1973

[a]Refers to numbers on Figure 2-25.

[b]Numbers in parentheses are the reference numbers of the areas as designated in the decision documents.

[c]An accelerated wilderness inventory was authorized for the Dirty Devil River on March 8, 1979. About 90,000 acres has been designated a Wilderness Study Area.

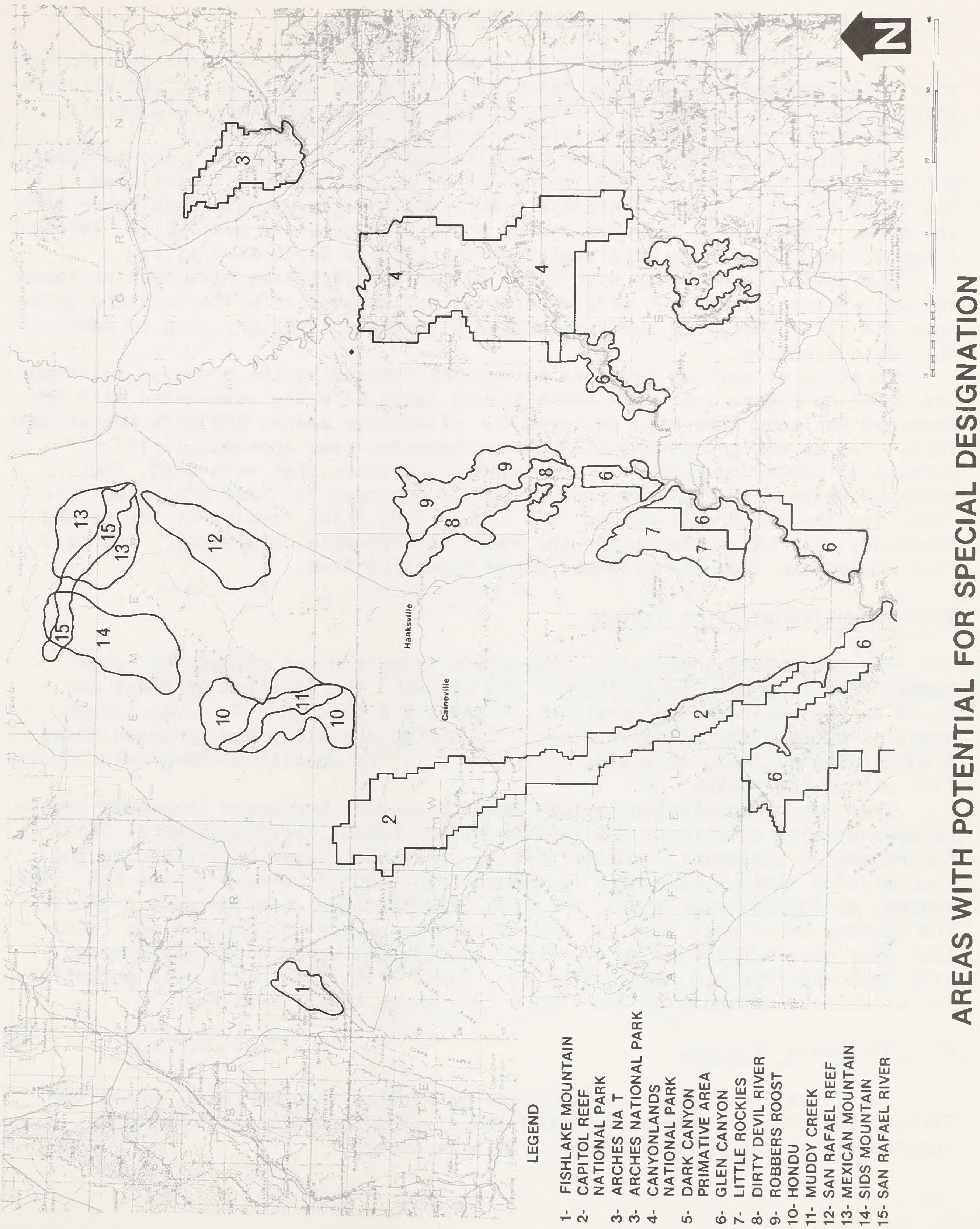

AREAS WITH POTENTIAL FOR SPECIAL DESIGNATION
LEGEND
1- FISHLAKE MOUNTAIN
2- CAPITOL REEF NATIONAL PARK
3- ARCHES NA T
3- ARCHES NATIONAL PARK
4- CANYONLANDS NATIONAL PARK
5- DARK CANYON PRIMATIVE AREA
6- GLEN CANYON
7- LITTLE ROCKIES
8- DIRTY DEVIL RIVER
9- ROBBERS ROOST
10- HONDU
11- MUDDY CREEK
12- SAN RAFAEL REEF
13- MEXICAN MOUNTAIN
14- SIDS MOUNTAIN
15- SAN RAFAEL RIVER
Hanksville
Caineville
N

FIGURE 2-25

2. Primary Project Area and Coal Haul Railroad

The entire primary project area is allotted to livestock grazing. Approximately 43 stockmen hold permits for 3,913 cattle and 150 sheep on BLM allotments located partially within the primary project area and stockmen hold permits for 370 cattle on one Forest Service allotment (Partridge, 1977).

The local Morrison formation contains deposits of uranium. Though several mining claims have been staked, there are no producing mines in the area. Small quantities of coal, bentonite clay, sand and gravel have been taken from the area. This use is sporadic and no production data are available. Thirty-three mining claims have been staked at the Factory Bench town site.

BLM administered lands within the primary project area have been reviewed for wilderness values, and were determined not to possess wilderness character. Appendix II-17 describes the accelerated wilderness inventory used to make this determination.

Location of various land use categories crossed by the proposed railroad are shown on Figure 2-A. BLM administered lands directly associated with the proposed railroad have been reviewed for wilderness values and were tentatively identified as not possessing wilderness character (see Appendix II-17). Because of public concern over the inventory methods that were used, four roadless units that would be crossed by the proposed railroad are being reinventoried for wilderness values (see Figure 2-A). The results of the second inventory will be available for the final environmental statement. The railroad would pass near the proposed Hondu Primitive Area.

3. Power Transmission Systems

The proposed transmission lines cross five land use categories--open range, forest, urban, agricultural, and barren. The location of these are found on the environmental profiles, Figures 2-B through 2-M. Even though areas of potentially valuable mineral resources are along the proposed power transmission systems, no active mining or drilling operations have been identified within the routes.

The power transmission systems would pass near two areas that have been recommended for wilderness designation by the Forest Service (RARE II Final Environmental Statement). Other RARE II areas that would be crossed by the transmission systems have been recommended for non-wilderness in the FES. The systems would pass near a U.S. Fish and Wildlife Service Wilderness proposal. The systems would pass near 24, and through 5, Wilderness Study Areas (WSA) that have been identified by the BLM. The systems would also pass through nine uninventoried BLM roadless units. Table 2-15 lists areas with potential for wilderness designation and Figure 2-26 shows their locations.

4. Microwave Stations

The Moroni microwave station would be located in open range, while the Elkhorn would be located on forested lands. The Moroni station would be located within the proposed Hondu Primitive Area.

TABLE 2-15

Areas With Potential for Wilderness Designation Along Proposed Power Transmission System

Map Reference Number	Administering Agency	Name of Area	Proposed Transmission System Segment	Location of Proposed T/L Segment to Identified Area	Documentation
1.	USFS	4-307 Fishlake Mountain	Salt Wash to Jack Henry Junction	Proximate[a]	RARE II Final Environmental Statement January, 1979
2.		4-259 Pine Valley Mountain	Jack Henry Junction to Cedar Wash	Proximate	RARE II Final Environmental Statement January, 1979
	BLM	Uninventoried Roadless Units[b]	Salt Wash to Emery	Crosses units	IPP Accelerated Wilderness Inventory March, 1979
3.		UT-060-007			
4.		UT-060-009A			
5.		UT-060-009B			
6.		UT-060-010			
7.		UT-060-012			
8.		UT-060-013			
9.		UT-060-014			
10.		UT-060-015			
11.		Proposed Hondu Primitive Area	Salt Wash to Emery	Proximate	Last Chance P.U., 1975
12.		WSA UT-040-046	Jack Henry Junction to Cedar Wash	Proximate	IPP Accelerated Wilderness Inventory, March, 1979
13.		WSA[c] Far South Egans NV-040-172	Lincoln Junction to Gonder Substation	Corridor is approximately 1/2 mile within WSA milepost 55-58 (see Figure 2-M)	IPP Accelerated Wilderness Inventory March, 1979
14.		WSA[c] Mt. Grafton NV-040-169	Lincoln Junction to Gonder Substation	Corridor is approximately 1/4 to 1/2 mile within WSA milepost 65-77 (see Figure 2-M)	IPP Accelerated Wilderness Inventory March, 1979
15.		WSA[c] South Egan Range NV-040-168	Lincoln Junction to Gonder Substation	Proximate	IPP Accelerated Wilderness Inventory March, 1979
16.		Uninventoried roadless unit:[d] NV-040-123	Lincoln Junction to Gonder Substation	Corridor is 1/4 mile within unit milepost 77-85 (see Figure 2-M)	IPP Accelerated Wilderness Inventory March, 1979
17.		WSA UT-040-057 AZ-010-004	Cedar Wash to Gypsum Junction	Corridor is 330 feet within WSA milepost 1-10 (see Figure 2-I)	IPP Accelerated Wilderness Inventory, March, 1979
18.		WSA[c] Arrow Canyon Range NV-050-IPP-09	Lincoln Junction to Gypsum Junction	Proximate	IPP Accelerated Wilderness Inventory, March, 1979

TABLE 2-15 (concluded)

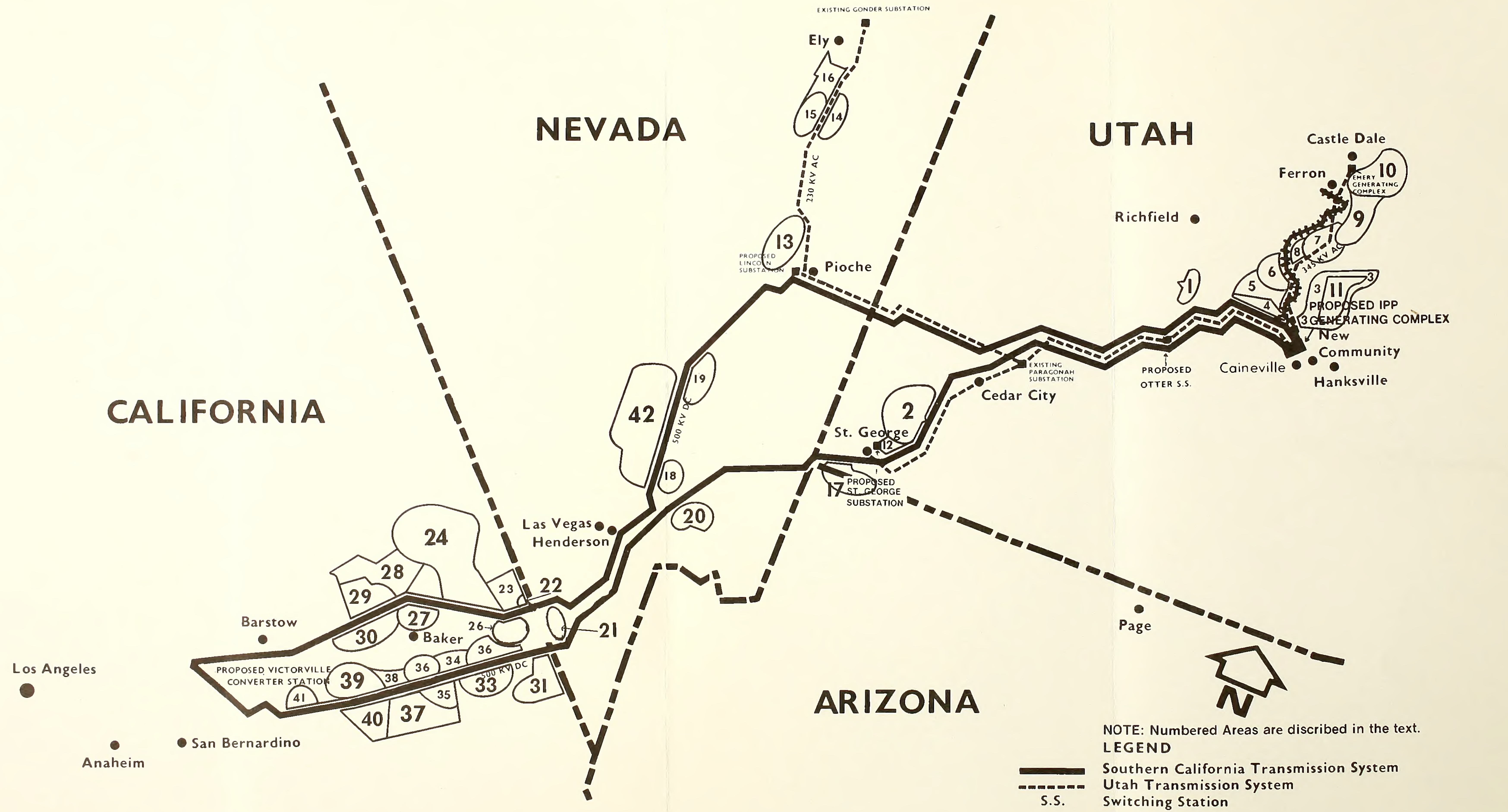
Map Reference Number	Administering Agency	Name of Area	Proposed Transmission System Segment	Location of Proposed T/L Segment to Identified Area	Documentation
19.		WSA[c] Delamar Mountain NV-050-IPP-07	Lincoln Junction to Gypsum Junction	Corridor is 200 feet within WSA milepost 57-71 (see Figure 2-D)	IPP Accelerated Wilderness Inventory, March, 1979
20.		WSA[c] Muddy Mountain NV-050-IPP-15	Cedar Wash to Gypsum Junction	Corridor is 330 feet within WSA milepost 85-89 (see Figure 2-I)	IPP Accelerated Wilderness Inventory, March, 1979
21.		WSA[c] McCullough Mountains NV-050-IPP-17	El Dorado Junction to Victorville Substation northern and southern lines	Proximate	IPP Accelerated Wilderness Inventory, March, 1979
22.		WSA: 225A	El Dorado Junction to Victorville Substation--northern line	Proximate	California Desert Wilderness Inventory, March, 1979
23.		225			
24.		222			
25.		222A			
26.		227			
27.		228			
28.		221			
29.		221A			
30.		242			
31.		WSA: 266	El Dorado to Victorville Substation--southern line	Proximate	California Desert Wilderness Inventory, March, 1979
32.		238B			
33.		245			
34.		244			
35.		249			
36.		243			
37.		250			
38.		251A			
39.		251			
40.		252			
41.		207			
42.	U.S. Fish and Wildlife Service	Desert Game Range	Lincoln Junction to Gypsum Junction	Proximate	Desert Game Range Wilderness Proposal

[a]Proximate is defined as within 5 miles of the proposed power transmission line routes.

[b]BLM lands directly associated with the proposed Salt Wash to Emery Transmission Segment have been inventoried for wilderness values, and were tentatively identified as not possessing wilderness character (see Appendix II-16). However, because of public concern over the inventory methods that were used, these eight roadless units are being reinventoried for wilderness values. The result of the second inventory will be available for the final environmental statement.

[c]Potential WSAs presently undergoing additional public review prior to a final decision. Results will be available for the final environmental statement.

[c]Unit was not inventoried during the IPP accelerated wilderness inventory because of its location contiguous to RARE II Unit #4-370 that has since been recommended as non-wilderness in the RARE II Final Environmental Statement. The unit is presently being inventoried for wilderness values and results will be available for the final environmental statement.



AREAS WITH POTENTIAL FOR
WILDERNESS DESIGNATION ALONG
POWER TRANSMISSION LINES

FIGURE 2-26

K. LAND USE PLANS AND CONTROLS

1. Regional Setting

Wayne County has a master plan dealing with general land uses and county goals, but lacks an adopted zoning ordinance to enforce these land uses and regulate development. If IPP were to locate in the county, the Wayne County Planning Commission plans to draft and adopt a zoning ordinance designed to deal with any projected growth and development (Siebert, 1979).

2. Primary Project Area and Coal Haul Railroad

The primary project area is within three BLM planning units (Henry Mountain, Forest and Last Chance), and a portion of the Fishlake National Forest, shown on Figure 2-27. Management Framework Plans have been prepared for the five BLM units. The Forest Service Land Management Plan is incomplete at this time. The location of planning units along the proposed railroad is shown on Figure 2-A.

The Six-County Commissioners Organization is currently assisting in the preparation of a Four-Corners Regional Development Plan which includes the conceptual planning and development of the favored town site.

3. Power Transmission Systems

Table 2-16 lists the status of planning units on federal lands and the responsible federal agency along the proposed transmission systems (Thurgood, 1977). Figures 2-B through 2-M show the location of these plans and areas of special concern.

The transmission lines cross several zoning categories. All areas are either unzoned or zoned "rural-open space-agricultural," except near Victorville, California which is "urban."

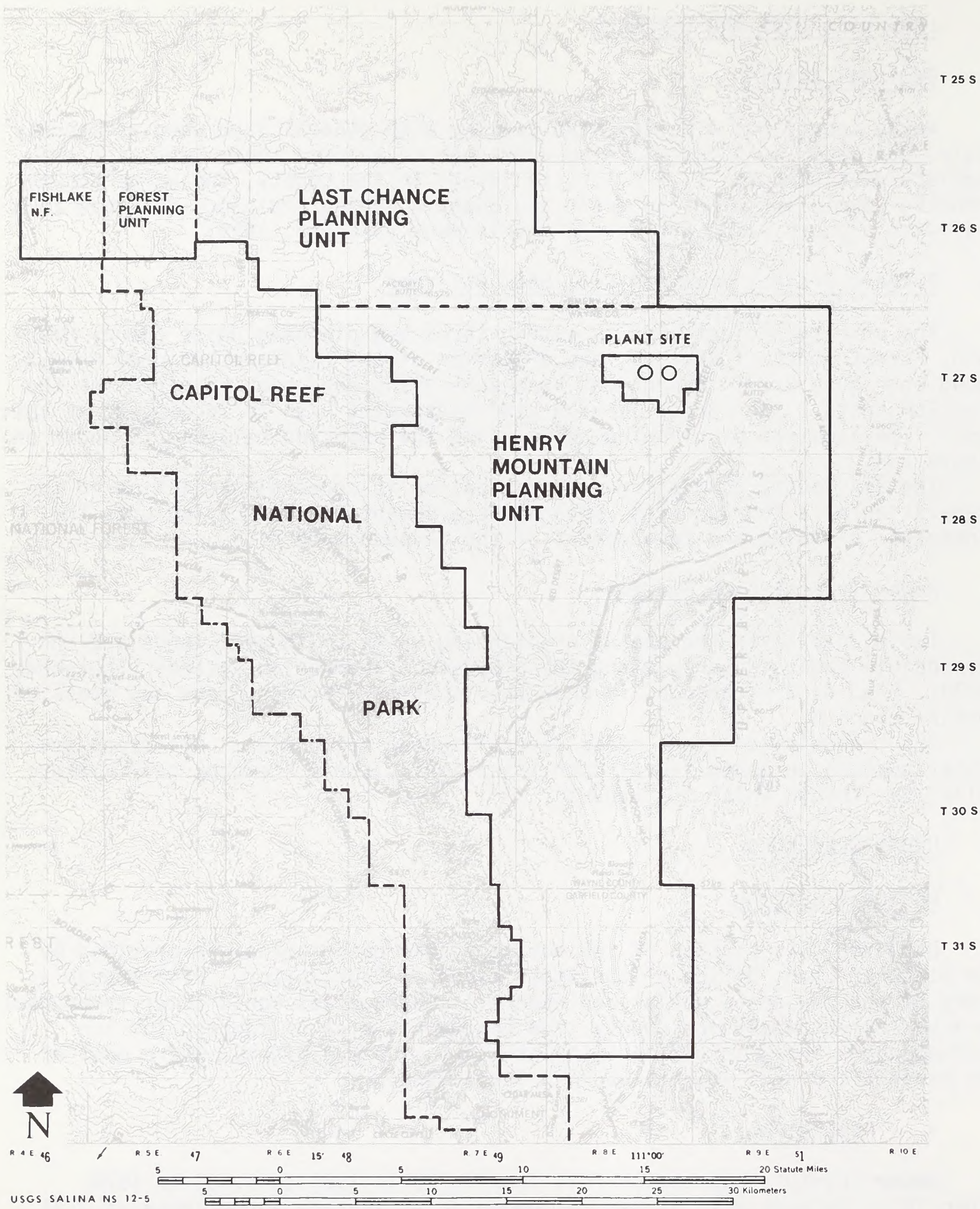
L. HUMAN RESOURCES

1. Regional Setting

Data for this portion of the socioeconomic description was provided by the State of Utah, Office of the State Planning Coordinator. Even though a share of the project's social and economic consequences would occur throughout an area surrounding Wayne County, the geographic area of concern for the socioeconomic analysis of the Salt Wash site is Wayne County, where most of the project's direct impacts would be experienced.

a. Population

Wayne County's population fell from 1,728 in 1960 to 1,483 in 1970. Since 1970, by contrast, it has increased at an average annual rate of 2.71 percent and had reached an estimated 1,800 by 1977 as shown on Table 2-17.



LAND USE PLANS FOR THE PRIMARY PROJECT AREA

FIGURE 2-27

TABLE 2-16

Federal Land Use Plans

Name of Plan	Agency	Status
Henry Mountain	BLM (Richfield District Office [D.O.])	Complete (to be revised)
Last Chance	BLM (Moab D.O.)	Complete (to be revised)
Muddy	BLM (Moab D.O.)	Complete (to be revised)
Forest	BLM (Richfield D.O.)	Complete
Land Management Plan	USFS (Fishlake N.F.)	Not complete
Parker Mountain	BLM (Richfield D.O.)	Complete (to be revised)
Piute	BLM (Richfield D.O.)	Complete (to be revised)
Buckskin	BLM (Cedar City D.O.)	Complete (to be revised)
Cedar	BLM (Cedar City D.O.)	Complete (to be revised)
Mud Springs	BLM (Cedar City D.O.)	Complete (to be revised)
Beaver	BLM (Cedar City D.O.)	Complete (to be revised)
Grand Wash	BLM (Arizona Strip D.O.)	Complete (to be revised)
Virgin River	BLM (Cedar City D.O.)	Revision in process
Pinyon	BLM (Cedar City D.O.)	Complete (to be revised)
Lake-Valley Wilson Creek	BLM (Ely D.O.)	Complete (to be revised)
Horse and Cattle Camp	BLM (Ely D.O.)	Complete (to be revised)
White River	BLM (Ely D.O.)	Complete (to be revised)
Caliente	BLM (Las Vegas D.O.)	Revision in process
Virgin Valley	BLM (Las Vegas D.O.)	Complete (to be revised)
Stateline	BLM (Las Vegas D.O.)	Complete (to be revised)
East Mojave	BLM (Riverside D.O.)	Not complete
Kingston	BLM (Riverside D.O.)	Not complete

TABLE 2-16 (concluded)

Name of Plan	Agency	Status
Owlshead-Amargosa	BLM (Riverside D.O.)	Not complete
Mojave Basin	BLM (Riverside D.O.)	Not complete
Calico	BLM (Riverside D.O.)	Not complete
Johnson-Morongo	BLM (Riverside D.O.)	Not complete
Stoddard	BLM (Riverside D.O.)	Not complete
Kramer	BLM (Riverside D.O.)	Not complete

TABLE 2-17

Population of Wayne County, 1960 to 1977

County	1960	1970	1977	Average Annual Growth Rate 1960-1970	1970-1977
Wayne County	1,728	1,483	1,800	-1.52	2.81

Source: UPC, 1978.

Incorporated communities in Wayne County have shared the periods of decline and growth, as shown on Table 2-18. Since 1960, the proportion of the county's population residing in unincorporated areas has remained relatively constant. Hanksville although unincorporated is the closest population center to the proposed site. Its estimated 1977 population was about 400.

TABLE 2-18

Population of Wayne County Communities

Communities	1960	1970	1975
Bicknell	366	261	282
Loa	359	324	341
Torrey	128	84	104
Unincorporated	875	811	974

Sources: U.S. Bureau of the Census, 1970, and Current Population Reports, 1977.

b. Employment

In 1975, Wayne County's largest employment sectors were government, 34.2 percent of total county employment and agriculture, 26.4 percent of the total. An additional 10.8 percent of county employment was in the trade sector and the service sector combined. The four sectors account for 71.4 percent of county employment. Table 2-19 indicates the trends in county employment during the period 1960 to 1975.

Wayne County's economy shows a lack of diversity and has provided insufficient economic opportunity for county residents. The earlier tendency to emigrate as a result of this appears to have reversed during the 1970s, mainly due to increased employment in the government sector. During the years prior to the 1970s, formerly significant employment sectors such as agriculture experienced rapid decline. Employment in private non-farm sectors has increased slightly during the 1970s mostly due to changes in the mining and construction sectors.

During the 1970s, the number of proprietors has been fairly constant with farm proprietors accounting for 59.7 percent (1970) to 55.6 percent (1974). Farm wage and salary employment has declined by over 28 percent during the

TABLE 2-19

Distribution of Employment By Industry and Type in Wayne County, 1960-1975[a]

	1960	1970	1975
Total Employment	480	644	731
Number of Proprietors		298	293
Farm Proprietors		178	163
Non-Farm Proprietors		120	130
Wage and Salary Employment		346	438
Farm		26	30
Non-Farm		320	408
Government	119	203	250
Federal		46	74
State and Local		157	176
Private Non-farm	172	117	158
Manufacturing	14	(D)	23
Mining	31	--	(D)
Construction	32	(D)	(D)
T.C.U.[b]	24	(D)	4
Trade	52	37	37
F.I.R.E[c]	3	(D)	6
Services	16	38	42
Other	--	--	--

Source: U.S. Department of Commerce, Bureau of Economic Analysis, 1977.

[a]Number of jobs, full and part-time.

[b]Transportation, Communication, and Utilities.

[c]Finance, Insurance, and Real Estate.

(D)--Not shown to avoid disclosure of confidential information. Data not included in totals.

1970s and has fallen from 11 percent of total wage and salary employment in 1970 to 6.9 percent in 1974. The presence of an unusual concentration of proprietors in agriculture makes it an important employment sector in Wayne County. Table 2-20 shows that mining and construction have shown a tendency to expand in recent years.

c. Income

As a result of low labor force participation and a large dependent population (i.e., proportionately more persons in the county of non-working age than is true of the state or nation), net earnings is a relatively small component of personal income. Nonlabor income is important to the county economy. Property income and transfer payments such as pensions and welfare payments together make up 39.3 percent of personal income. In part this reflects the economic importance of the county's relatively large retirement-age population. Retirement and disability benefits, plus medical assistance in Wayne County, have increased steadily since 1959 reaching 81.8 percent of the total transfer payments in 1974. Earnings by industrial source are shown in Table 2-21.

The earnings data demonstrate the importance of government to the county economy. Next, in order of importance, is trade, and then the farm sector. However, the two undisclosed sectors, mining and construction, together accounted for 13.9 percent of earnings in 1975 and could therefore alter the ranking of the trade or farm sectors or of both. Total personal and per capita income are shown in Table 2-22.

d. Infrastructures

(1) Public Transportation

No public transportation is available in Wayne County.

(2) Public Utilities

(a) Water

Water for domestic purposes in unincorporated areas is generally supplied by individual wells. Hanksville, although unincorporated, operates a sub-standard water system supplied by a single well. Thirteen privately owned wells supplement the Hanksville water supply. Hanksville has received a grant from the State Division of Water Resources to improve and expand the system to handle about 100 more hookups and meet state standards. The capacities and status of water system in Hanksville, Loa, Bicknell, and Torrey are summarized in Table 2-23.

(b) Sewage Systems

Septic tanks and cesspools are the only type of sewage systems in Wayne County. In Hanksville, the impervious nature of the soil requires large drainfields, which necessitates large acreage per household. In Torrey, the water table is close to ground surface and additional drainfields cannot be installed.

TABLE 2-20

Nonagricultural Employment[a], Wayne County,
(in Absolute Amounts and Percent of Total)

	1975 Number of Jobs	1975 % of Total	1976 Number of Jobs	1976 % of Total	1977 Number of Jobs	1977 % of Total
Total Nonagricultural	363	100.0	370	100.0	437	100.0
Manufacturing	21	5.8	25	6.8	28	6.4
Mining	31	8.5	21	5.7	54	12.4
Construction	13	3.6	25	6.8	48	11.0
Transportation	4	1.1	3	0.8	4	0.9
Trade	38	10.5	46	12.4	47	10.8
Finance	6	1.7	5	1.4	6	1.4
Services	37	10.2	36	9.7	30	6.9
Federal Government	76	20.9	75	20.2	76	17.4
State Government	24	6.6	25	6.8	25	5.7
Local Government	108	29.8	104	28.1	114	26.1

Source: UPC, 1978.

[a]Full and part-time jobs.

TABLE 2-21

Total Earnings (Dollars By Industrial Source)
Wayne County, 1975

	1976
Total Earnings	3,091
Agriculture	1,076
Mining	(D)
Construction	(D)
T.C.U.[a]	132
Trade	555
F.I.R.E.[b]	(D)
Services	177
Government	1,865

Source: U.S. Department of Commerce, Bureau of Economic Analysis, 1978.

[a]Transportation, Communication, Utilities.

[b]Finance, Insurance, Real Estate.

(D)--Not shown to avoid disclosure of confidential information, data are included in totals.

TABLE 2-22

Total Personal[a] and Per Capita Income

	1965	1970	1971	1972	1973	1974	1975	1976
Total Personal Income in Thousands of Dollars	2,200	3,303	3,629	4,278	5,045	5,496	6,112	6,996
Per Capital Personal Income in Thousands of Dollars	2,390	2,205	2,423	2,679	3,244	3,319	3,560	4,053

Source: U.S. Department of Commerce, Bureau of Economic Analysis, 1977.

[a]Adjusted for place of residence rather than place of employment.

TABLE 2-23

Existing Culinary Water Supply Systems in Wayne County

	Communities			
	Hanksville	Loa	Bicknell	Torrey
Present Number of Hookups	30	200	175	70
Additional Hook-ups Possible with Present System	0	79	275	5
Hookups Possible With Water Rights	--	384	481	849
Storage Capacity	13,000 gal.	223,200 gal.	300,000 gal.	60,000 gal.
Status of System	Sub-standard	Meets state standards	Meets state standards	Meets state standards

Source: UPC, 1978.

(c) Solid Waste

Residents in Wayne County must transport solid wastes to open dumps near Hanksville, Loa, Bicknell, and Torrey. None of the dumps meet state standards for sanitary land fills. Loa and Bicknell contract to private parties for digging and covering while the Torrey dump is handled entirely on a volunteer basis.

(3) Public Safety

(a) Law Enforcement

The Wayne County Sheriffs Department, located in Loa, consists of the Sheriff, a deputy, and a part-time deputy. In addition to county law enforcement personel, Hanksville has one part-time deputy, Bicknell has one part-time marshall, and the State Highway Patrol furnishes one patrolman. None of the communities own any police equipment. The County jail at Loa has capacity for two inmates and is the only detention center in the county. Law enforcement is generally adequate under present conditions, but Hanksville would like a full-time police officer.

(b) Fire Protection

Completely volunteer fire stations are located in Loa, Bicknell, and Torrey. Hanksville fire protection is also volunteer. One new pumper truck is needed by the County to provide protection for Hanksville and Torrey.

(4) Public Health

There are no hospitals in Wayne County. Residents requiring long-term care or hospitalization must travel to Richfield, Gunnison, Moab, or Price for limited diagnostic, surgical, and emergency services or to Provo or Salt Lake for specialized care. Ambulance service is provided by emergency medical technicians stationed in Hanksville and Loa. One nurse practitioner is available in Bicknell.

(5) Education

Schools in the Wayne County School District include Hanksville Elementary, Loa Elementary, and Wayne County Middle and High Schools in Bicknell. All Wayne County schools have design capacity greater than current student enrollment. Students in grades 7 through 12 are bused from throughout the district to the schools in Bicknell. Selected information on Wayne County Schools is provided in Table 2-24.

Wayne County provides a bookmobile at a cost of $13,200 per year which services both incorporated communities and unincorporated areas. Libraries are also located in the elementary schools in Hanksville and Loa and the Wayne County Middle and High schools in Bicknell.

(6) Housing

A 1977 survey of Wayne County housing reveals that of 695 housing units, 191 are substandard, 37 are dilapidated and should be replaced, and 154 are deteriorated but could be rehabilitated. Forty-five and two-tenth percent of

TABLE 2-24

Selected School Information for Schools in the Wayne County School District, 1977-78

School Name and Location	Enrollment	Student-Teacher Ratio[a]	School Capacity	Expansion Plans
Hanksville Elementary Hanksville	46	27 to 1	82	Currently being improved
Loa Elementary, Loa	156		158	--
Wayne County Middle School Bicknell	102	24 to 1	175	--
Wayne County High School Bicknell	157		144	--
Total	461		559	

Source: UPC, 1978.

[a]The district plans to hire two new teachers by 1990.

the housing units in the county were built prior to 1939. The current distribution of housing by type and location is given in Table 2-25.

(7) Local Government Financing

Currently, local governments depend on property taxes for approximately one-half their total revenues, and about 47 percent of the remainder comes from state and federal sources. The ability of local governments to engage indebt financing of capital projects through bonding is functionally dependent upon the size of the property tax base, though formation of special districts under current Utah law allows some flexibility in exceeding strict constitutional limitations in this regard.

e. Quality of Life

The data for this section is from a sample survey by Dr. Stanley Albrecht (1978). Fifty-five Wayne County residents were interviewed concerning the project.

A majority of local residents like living in Wayne County. They view the county as an excellent place to raise a family in a small town atmosphere with high quality friends and neighbors. Many former residents, who have moved from the county, would move back if they had the opportunity to earn a liveable income.

Wayne County is highly homogeneous in terms of its population characteristics. Most residents are members of the LDS Church (Mormon) and many of their weekly as well as Sunday activities are organized around their church. Newcomers to the area who are not members of the LDS faith frequently find it very difficult to feel a part of the local communities. While oldtime residents express very favorable attitudes toward the area, many newcomers are unhappy and would like to move elsewhere. In addition to religious homogeneity, most area residents come from similar cultural and ethnic backgrounds. Nearly 100 percent of the population is white. Crime rates are low, divorce and suicide rates are low, and many of the other social problems that characterize much of urban America are extremely rare.

Based on objective quality of life indicators, Wayne County is one of the more deprived areas of the State of Utah. However, based on perceived quality of life, particularly as expressed by long-time residents, Wayne County is an excellent place to live. The findings clearly indicate that Wayne County residents are generally satisfied with their level of community political input. Sixty-nine percent felt that citizen participation in community decisions was "satisfactory" to "exceptional."

The respondents also showed a positive attitude toward the performance and effectiveness of local government. Fifty-six percent rated local government "satisfactory" to "exceptional" in effectiveness. Eight-three percent were "only somewhat satisfied" or "very satisfied" with the performance of local officials. The dominant view is that local government performs well but could improve.

Most respondents were not satisfied with existing employment oppor tunities. Over half (55 percent) rated the current situation as less than satisfactory. In contrast, 29 percent rated opportunities as above average.

Population and social change in Wayne County have occurred at a slower rate than is true in other areas of Utah. Wayne County has not been characterized by any major boom-bust cycles. Uranium exploration and mining brought with it some flurries of economic activity about two decades ago but the population trend has been one of persistent decline.

TABLE 2-25

Wayne County Housing Inventory

	Single-Family	Multi-Family	Mobile Home		Total
			In Parks	On Lots	
Bicknell	122	0	3		125
Loa	115	0	12		127
Torrey	68	0	1		69
Other	323[a]	2	49		374
Total	628	2	15	50	695

Source: Olympus Research Centers, 1978.

[a]Fifty are in Hanksville.

Each respondent in the survey was asked a series of questions concerning their views on economic and population growth. Sixty percent indicated that they either supported or strongly supported additional people moving into the area. Another 26 percent reported that they were neutral on the issue while the remainder opposed an in-migration.

Though most area residents favor some population growth, they do not want rapid growth. When asked what rate of population change they would most favor, over four-fifths preferred moderate growth. The remainder were about equally split between no growth and rapid growth. Almost 70 percent of the respondents felt that new people would have a good or a very good effect on their communities. Of the remainder, 12 percent anticipated no effect and 18 percent felt the effect would be bad or very bad. The latter were particularly concerned about an influx of transients and others whose values and lifestyles would differ significantly from their own.

Eighty-three percent reported that they either supported or strongly supported economic growth in Wayne County. Fewer than 4 percent were opposed to economic growth. This reflects a need for new employment and income opportunities. However, when asked their preference regarding the rate of economic growth, most respondents would prefer moderate economic growth. Eighty-one percent preferred moderate growth, 15 percent rapid growth, and only 4 percent no growth.

2. <u>Coal Source Area</u>

Carbon and Emery Counties would be the area influenced by additional mining to provide coal for IPP. A detailed discussion of the coal source area may be found in the <u>Environmental Statement: Development of Coal Resources in Central Utah</u>.

As a consequence of the recent expansion of the coal industry as well as the construction of the Huntington Canyon and the first two units of the Emery power plant, the two county area is again in a rapid growth period. Important changes have occurred in several quality of life indicators during the period of growth. One of the most important indicators are crime rates. In 1974, the Emery County Sheriff's office handled 900 cases. By 1977 this had risen to 2,885 cases. During this same period, the population had increased by about 32 percent from 6,200 to over 8,000. Thus, crime tripled while the population only increased by one-third. The rate of increase was lower in Carbon County. The Carbon County Sheriff's office reported about a 20 percent increase in major crimes between 1975 and 1977. A larger increase occurred in "victimless crimes" such as traffic, public intoxication, and drunk driving.

State of Utah reports show a 40 percent increase in felonies (such as robbery, rape, murder, and burglary over $250.00) in State District 7 between 1975 and 1976. (District 7 includes Carbon and Emery counties along with San Juan and Grand Counties.) This increase is not solely a function of population growth because the felony rate per 1,000 population increased 34.9 percent between 1975 and 1976.

According to the Emery County Sheriff's office, approximately 80 percent of the crimes reported involve burglary, theft, and vandalism. However, major increases have also been noted in bar fights, family beatings, and in alcohol and drug-related offenses. Similar reports were given by Carbon County law enforcement personnel.

Data compiled from the Juvenile Court for the State of Utah indicate that juvenile crime trends in Carbon and Emery Counties differ from overall crime trends. The number of juvenile referrals has increased slightly between 1971

and 1976, but the increase has not been as rapid as increases in population. According to statistics, juvenile criminal offenses are occurring less frequently, on a per capita basis, while overall crime rates are increasing significantly. Truancy and other problems in schools have increased. The Emery County School Superintendent reported that children are continually transferring between schools and average daily attendance figures have dropped from between 95 and 96 percent to between 92 and 93 percent.

Alcohol and drug abuse have also increased faster than population increases. The absentee rate at some area mines is reported to be as high as 28 percent. It is estimated that as much as 75 percent of these absences are related to the use of alcohol. If the figures are accurate, problems with alcohol affects the employment and productivity of about 1,500 of the area's 7,200 miners. Some of the mines are planning special projects for counseling to deal with alcohol-related problems. The 4-Corners Area Comprehensive Mental Health Center in Price recently hired a full-time substance abuse counselor.

The 4-Corners Area Comprehensive Mental Health Center reports that their caseload has increased from 723 in 1973 to 1,150 in 1977. The Comprehensive Mental Health Center operates 5 psychiatric inpatient beds at the Carbon Hospital. In addition, two therapists are now working full-time in Emery County. A half-time alcohol and drug abuse counselor, associated with the area Mental Health Center, is also available in Emery County. A new mental health clinic is needed in Carbon County.

The area's mental health counselors have observed a major caseload increase in marital and family problems, depression, and attempted suicide. Counselors report that more newcomers require their services than do long-time area residents. Many problems are related to job situation, lack of recreational and social opportunities, and lack of integration into the local community and culture.

Surveys were conducted in 1975, 1977, and again in 1978 to determine the attitudes of Carbon and Emery County residents toward their communities (Albrecht, 1975, 1977, 1978). In the 1975 survey, over 50 percent of those surveyed said they were "very much satisfied" with their community. An additional 40 percent indicated they were "pretty much satisfied."

The characteristic most liked by Carbon and Emery County residents was the smallness of their communities. Many people said that advantages of their communities were: the rural character; easy access to outdoor recreational opportunities such as fishing and hunting; access to the outdoors; the opportunity to develop close personal ties with neighbors; and it was a good place to raise a family.

Fewer items were listed as drawbacks to life in Carbon and Emery Counties. Two themes were common in the responses. Respondents were concerned with the absence of shopping facilities and variety, and they were very concerned about availability and quality of local medical services. These two concerns were followed by dissatisfaction with other public services such as sewer, water, and garbage collection.

The 1977 survey was of "key informants." Among those interviewed were school superintendents, extension agents, hospital administrators, mayors, county commissioners, sheriffs, the Four Corners Mental health director, and other community leaders.

Interviews with the key informants generally supported impressions obtained from the 1975 random survey. Most respondents expressed satisfaction with their communities. When asked, however, if most people in the area felt that they were a part of their community, one-half responded negatively. The

consensus seemed to be that new residents and non-Mormons were not being accepted by longer-term residents. The key informants said an important factor to many people was that more local young people could be employed locally instead of having to seek employment outside the area. Presently, 66 percent of the Huntington power plant work force are local people and 61 percent of the work force for Emery Units 1 and 2 are local people. Eighty-one percent of the coal miners for the plants are local people.

Key informants tended to stress the following as primary disadvantages of living in the Carbon-Emery County area: lack of organized recreation programs, shortage of water, difficulty in finding adequate (and affordable) housing, lack of facilities and services such as shopping and medical care, isolation from larger communities, and an influx of undesirable types of people.

In the 1978 study, respondents were asked to rate their community on a ten-point scale; a score of ten representing the best possible community and a score of one representing the worst possible community. Over 70 percent of the respondents rated their communities seven or higher. Only 2 percent gave a rating of three or lower. The respondents tended to express optimism about changes in the area; 48 percent said their communities were becoming better. Data from the 1978 survey indicates that local residents favor growth in the economy and size of the local population. Two-thirds of the respondents indicated that the effect of newcomers has been positive for the area. Less than one-quarter felt the effect had been negative.

In response to a question concerning whether there was a problem between long-time residents and newcomers, 31 percent of the 1978 respondents felt that there was no problem at all. Forty percent felt that there was a minor problem, 26 percent felt that there was a moderate problem, and 3 percent were of the opinion that conflict was serious. These results indicate that some adjustment problems are occuring in the area as have been experienced in other boom growth areas in the West.

3. Power Transmission Systems

For the purposes of this environmental statement, the communities along the proposed corridors are placed into two categories. The larger towns (1,000 people or more) such as Delta, Beaver, Cedar City, Las Vegas, Ely, and Barstow are mostly located on major highways and are tourist-service oriented with a large number of services.

The other category would be towns having less than 1,000 people such as Mesquite, Littlefield, and Panaca. These are largely agrarian based communities which provide very limited goods and services.

Table 2-26 shows the 1978 assessed valuation of taxable property in the counties through which the transmission line would pass. These range from a low of $3,951,598 in Wayne County, Utah, to a high of $2,586,609,000 in San Bernardino County, California. The San Bernardino County tax base is more than 642 times larger than that for Piute County.

M. HUMAN HEALTH AND SAFETY

There are several natural and man-made features in areas affected by the project which present potential risks to health and safety. Potential risks include highways, unimproved roads, farm and ranch machinery, climatic extremes, rivers, springs, and cliffs.

Most of Wayne County is sparsely populated and risks associated with existing hazards are low. Noise levels are generally low.

TABLE 2-26

Assessed Value of Taxable Property

County	Assessed Value Utah	Arizona	Nevada	California
Wayne	$ 3,951,598			
Emery	$ 121,183,935			
Garfield	$ 14,512,916			
Iron	$ 62,529,093			
Piute	$ 4,767,497			
Sevier	$ 30,372,359			
Washington	$ 51,751,402			
Mojave		$202,754,985		
Lincoln			$ 35,285,107	
Clark			$2,718,751,116	
White Pine			$ 53,074,285	
San Bernardino				$2,586,609,000

Source: Hillier, 1977 and Statistical Review of Government in Utah-1978.

N. FUTURE ENVIRONMENT WITHOUT THE PROPOSED PROJECT

1. Climate and Air Quality

Without other major developments in the area, air quality would remain unchanged in the region of the Salt Wash site.

2. Topography, Geology, Minerals, and Paleontology

Topography, geology, and minerals would remain relatively unchanged. Mineral exploration would continue. Paleontological resources are non-renewable. Rockhounding and fossil collecting are popular hobbies. As populations in most of Utah increase and more people use ORVs to obtain access to remote areas, paleontological resources will continue to be destroyed. Natural weathering of fossils will also continue.

3. Soils

a. Regional Setting and Primary Project Area

The soil resources within this area would remain basically the same as described under existing environment.

b. Power Transmission Systems

Soils along the transmission routes would remain unchanged except where urban expansion around Cedar City, and St. George, Utah; Las Vegas and Henderson, Nevada; and Victorville, California would occupy additional acreages. The amount of additional acreage occupied or disturbed is not known.

4. Water Resources

Assuming that future water demands would be a result of the present human activity pattern of the region, the future water resources of the project area would not be significantly changed.

5. Vegetation

a. Regional Setting and Primary Project Area

A major change in the vegetation within the regional setting and primary project area would not be expected within 35 years. The previously over-grazed range in the area has been showing very gradual improvement with changes in management. This trend is expected to continue.

b. Power Transmission Systems

Along the transmission line routes, increased urbanization around present urban areas (Cedar City and St. George, Utah; Las Vegas and Henderson, Nevada; and Victorville, California) would be the major change agent. This would mean that native vegetation would be replaced by cultivated and irrigated vegetation in areas which become urbanized.

6. Animal Life

a. Regional Setting and Primary Project Area

Human population trends indicate that there will be a slight decline in the population of Wayne County over the next 35 years. The distribution of wildlife in the regional setting and primary project area should therefore remain approximately as they are at present. However, the human population is increasing along the Wasatch Front and in Emery, Carbon, and Grand Counties. Since these areas apply the majority of hunting and fishing pressure within the geographic area of concern (UDWR, 1976b), there may be a decrease in the fish population in the region over the next 35 years. With management and issuance of a limited number of hunting permits for deer, elk, bighorn sheep, buffalo, and antelope, numbers may increase in the future.

b. Power Transmission Systems

Continued urban expansion and population increase at Cedar City and St. George, Utah; Las Vegas and Henderson, Nevada; and Victorville, California will remove wildlife habitat. Further development at Cedar City could infringe upon the habitat of the endangered Utah prairie dog. Development at St. George could destroy some habitat for the gila monster and the desert tortoise. Expansion at Henderson and Las Vegas could expose bighorn sheep to more human disturbance. Near Victorville, historic range of the Mojave ground squirrel could be infringed upon. The environment along other portions of the transmission lines will likely remain essentially unchanged as access is already available to the majority of the proposed route.

7. Cultural Resources

Cultural resources will continue to be subject to vandalism and weathering. Vandalism will increase as recreational use increases.

8. Recreation and Aesthetics

a. Regional Setting and Primary Project Area

The regional setting environment would continue to change without the project. Population is increasing in Utah and recreation demands will also increase.

Several roads and highways within the regional setting are currently undergoing upgrading or are planned for reconstruction. This would reduce travel times and increase access to the recreation resources in the regional setting.

b. Power Transmission Systems

Some segments of the power transmission system routes will encounter moderate to more rapid growth and heavier pressure on the recreation and aesthetics resources.

9. Land Use

a. Regional Setting and Primary Project Area

Land uses within that part of Wayne County east of the Capitol Reef National Park would remain unchanged without the proposed project.

As a result of wilderness review, it is possible that areas within the region could be designated as wilderness by Congress. As a result of other special studies, it is possible that Primitive and Wild and Scenic River designations could also be made for the San Rafael and Dirty Devil Rivers and Muddy Creek.

b. Power Transmission Systems

Several urban and agricultural areas along the transmission lines would continue to see additional urbanization. The areas occur around Cedar City and St. George, Utah; Henderson and Las Vegas, Nevada; and Victorville, California.

As a result of wilderness review, it is possible that areas along the transmission system could be designated as wilderness by Congress.

10. Land Use Plans and Controls

Land use planning is a dynamic process, however, because of projected use and demands it is expected that plans and controls would basically remain unchanged. Both Forest Service and BLM planning systems allow for consideration of new proposals.

11. Human Resources

a. Regional Setting Exclusive of Coal Source

It is assumed that farm employment in the county would decline during the projection period at an average of 3.0 percent per year and that basic employment in mining would remain constant at present levels.

Essentially no change in basic employment in construction and manufacturing would occur during the period. Trade and services employment is expected to increase slightly by 1990 because of tourism and recreational activities. Table 2-27 summarizes basic employment assumptions up to 1990.

The behavior of the Wayne County population, based on these employment assumptions is reported in Table 2-28. This is a baseline population projection and assumes no unusual occurrences not detailed in the previous discussion.

Because only slight change in populations is expected, other factors of human resources would likely remain unchanged.

b. Coal Source Area

For a discussion of probable future environment without the proposal, see Environmental Statement: Development of Coal Resources in Central Utah, published by the U.S. Geological Survey, 1978.

TABLE 2-27

Basic Future Employment Assumptions for Wayne County

Sector	Jobs: Full and Part Time 1975	1980	1985	1990
Agriculture	167	145	121	101
Mining	15	15	15	15
Construction	12	11	11	11
Manufacturing	7	7	7	7
Trade	10	11	12	15
Services	30	33	37	42
Government	54	54	54	54
Total	295	276	257	245

Source: UPC, 1978.

TABLE 2-28

Wayne County Population Without the Intermountain Power Project[a]

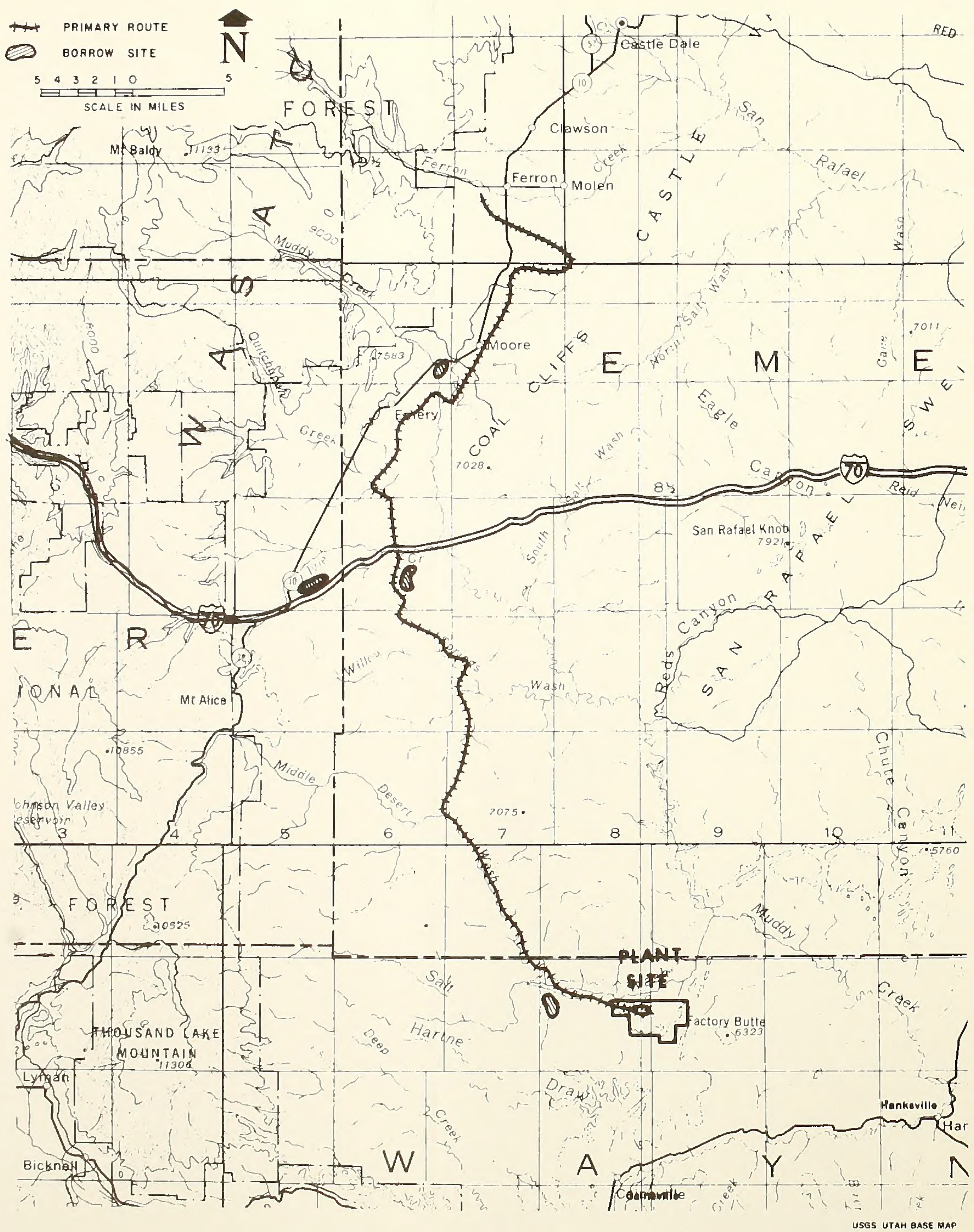
1980 population	1,870
1985 population	1,850
1990 population	1,830

Source: Bureau of Economic and Business Research, 1978.

[a]Future county population growth or decline is tied to changes in basic employment. Thus, projections of population are based on conditions assumed for each basic employment sector.

c. Transmission System

Present socioeconomic trends of growth, in the areas through which the transmission lines would pass, will probably continue over the long term.



LEGENO

VEGETATION
- F- Foresl
- MB- Mountain Brush
- PJ- Pinyon Juniper
- CO- Cold Oesert Shrub
- HO-J Joshua Tree Forest
- C- Chaparral
- B- Barren
- R- Riparian
- UA- Urban Agriculture
- HD- , Hot Oesert Shrub

SOIL TYPE
- 1- Oeep Alluvial Valley
- 2- Shallow, Shale-Clay
- 3- Shallow, Rocky
- 4- Desert
- 5- Mountain and Foothills

EROSION HAZARD
- 1- Slight-Moderate
- 2- Moderate-High
- 3- Severe

VISUAL FEATURES

SCENIC QUALITY
- A- High
- B- Medium
- C- Low

VISUAL ZONES
- F/M- Foreground/Middleground
- B- Background
- SS- Seldom Seen

SENSITIVITY
- H- High
- M- Medium
- L- Low

EXISTING MANMAOE CONTRAST
- H- High
- M- Medium
- L- Low

LANO USE
- R- Open Range
- F- Forest
- U- Urban
- A- Agriculture
- B- Barren

PLANNING UNIT BY NAME

AREAS OF SPECIAL CONCERN (AOSC)
- U-LO-Urban Low Oensily
- Ag- Agriculture
- R-II- U.S. Forest Service Rare II Wilderness Recommendation
- WSA-BLM Wilderness Study Area
- RA- BLM Uninventoried Roadless Area
- Others- By Name

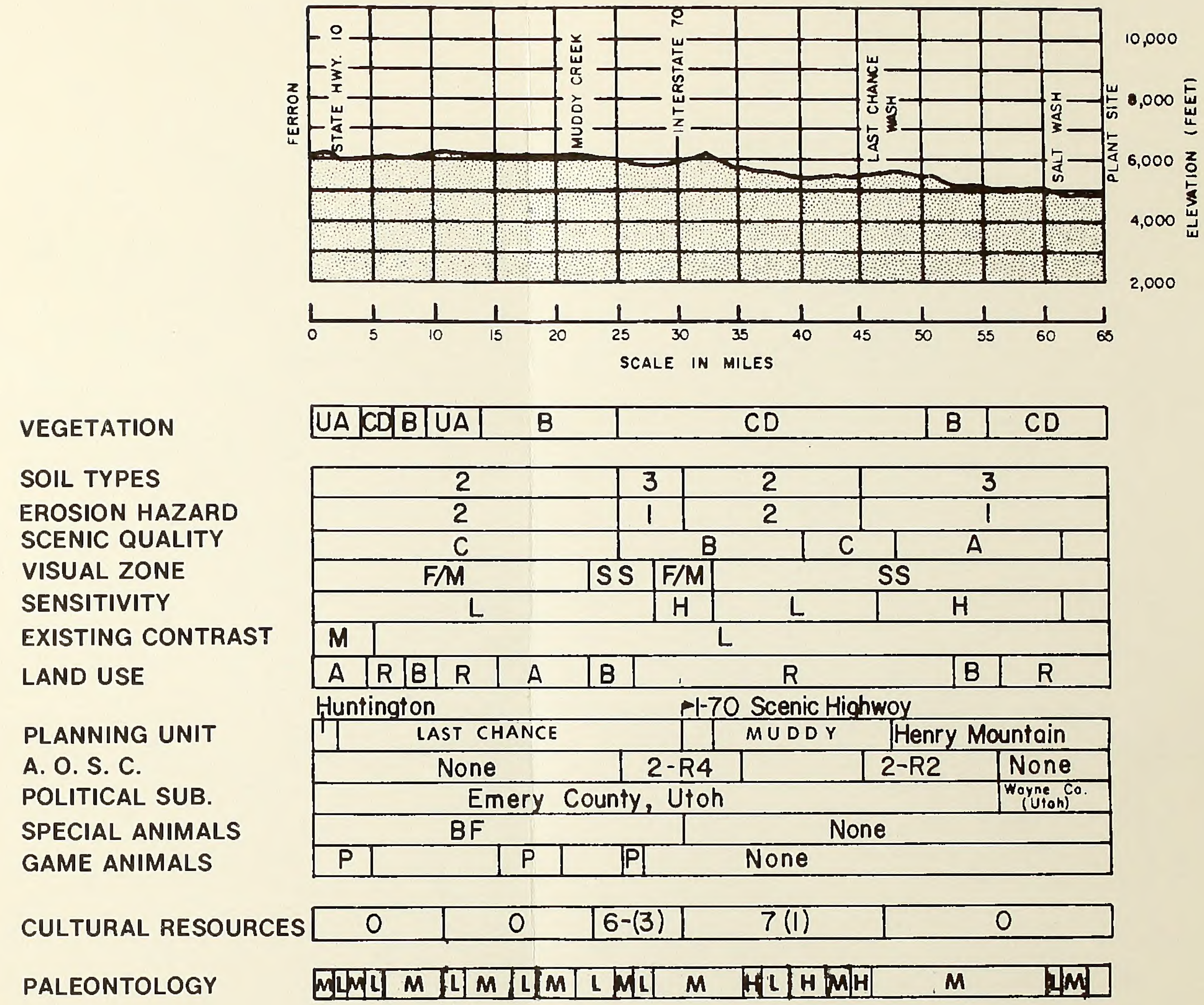
POLITICAL SUBDIVISIONS BY NAME

HABITAT OF SPECIAL ANIMAL LIFE
- UPD- Ulah Prairie Oog
- OT- Oesert Tortoise Concentration
- F- Threatened or Endangered Fish
- G- Gila Monster
- R- Raptor Concenlration Area
- BF- Potential Black-footed Ferret
- BT- Bendire's Thrasher and Gilded Flicker
- WH- Wild Horses
- WB- Wild Burros
- U- Species
- WF- Waler Fowl

IMPORTANT GAME HABITAT
- O- Critical Oeer Range
- B- Oesert Bighorn Sheep Range
- PB- Potential Desert Bighorn Sheep Range
- S- Sage Grouse Concentralion Area
- P- Pheasant Habatal

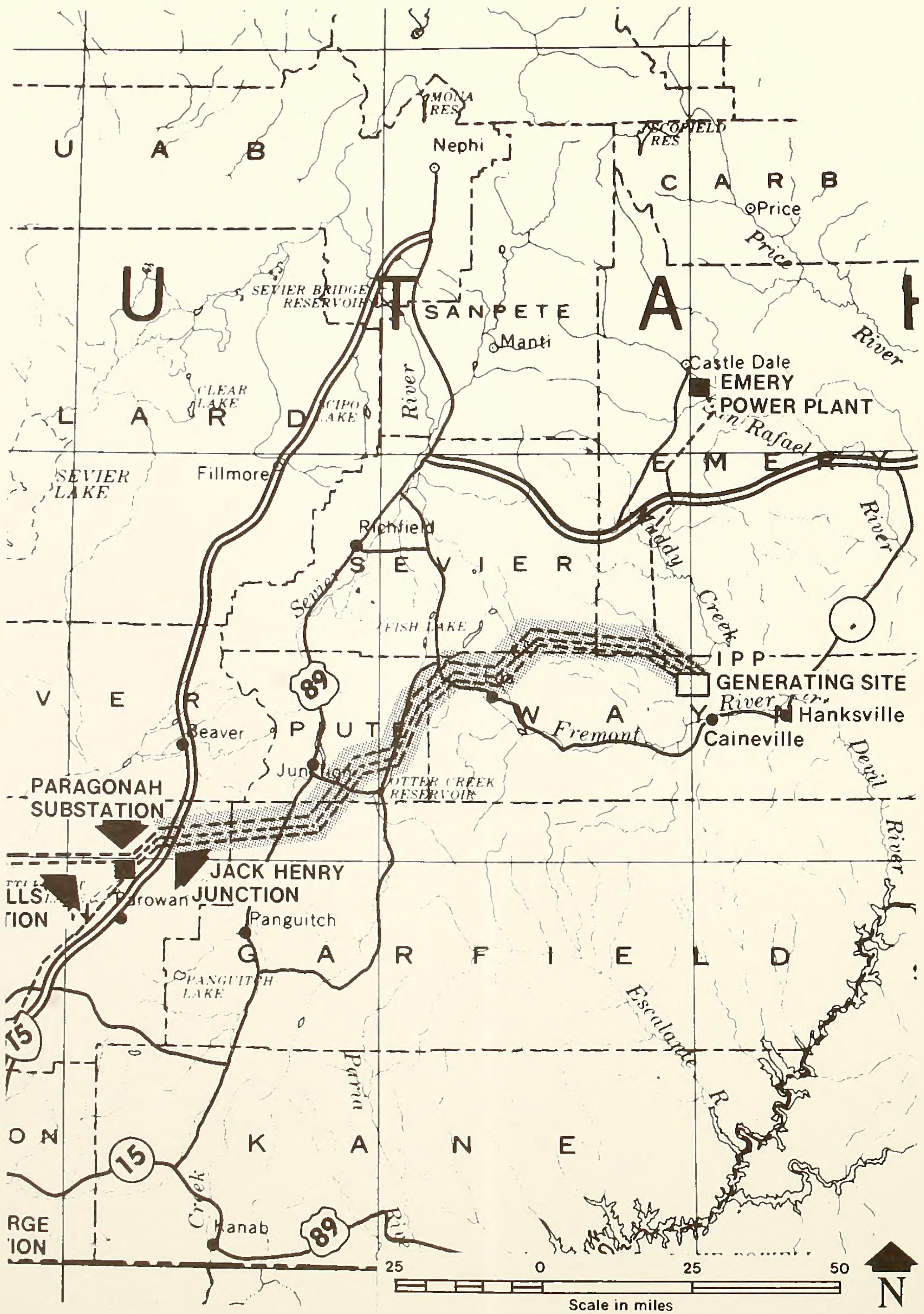
CULTURAL RESOURCES: NUMBER OF SITES
- ( ) Eligible for Nalional Register

PALEONTOLOGICAL RESOURCES
- H- Potentially High Paleontological Significance
- M- Potentially Medium Paleontological Significance
- L- Low Paleonlological Significance



ENVIRONMENTAL PROFILE:
COAL HAUL RAILROAD

FIGURE 2-A



LEGEND

VEGETATION
- F- Forest
- MB- Mountain Brush
- PJ- Pinyon Juniper
- CD- Cold Desert Shrub
- HD-J Joshua Tree Forest
- C- Chaparral
- B- Barren
- R- Riparian
- UA- Urban Agriculture
- HD- Hot Desert Shrub

SOIL TYPE
- 1- Deep Alluvial Valley
- 2- Shallow, Shale-Clay
- 3- Shallow, Rocky
- 4- Desert
- 5- Mountain and Foothills

EROSION HAZARD
- 1- Slight-Moderate
- 2- Moderate-High
- 3- Severe

VISUAL FEATURES

SCENIC QUALITY
- A- High
- B- Medium
- C- Low

VISUAL ZONES
- F/M- Foreground/Middleground
- B- Background
- SS- Seldom Seen

SENSITIVITY
- H- High
- M- Medium
- L- Low

EXISTING MANMADE CONTRAST
- H- High
- M- Medium
- L- Low

LAND USE
- R- Open Range
- F- Forest
- U- Urban
- A- Agriculture
- B- Barren

PLANNING UNIT BY NAME

AREAS OF SPECIAL CONCERN (AOSC)
- U-LD- Urban Low Density
- Ag- Agriculture
- R-II- U.S. Forest Service Rare II Wilderness Recommendation
- WSA- BLM Wilderness Study Area
- RA- BLM Uninventoried Roadless Area
- Others- By Name

POLITICAL SUBDIVISIONS BY NAME

HABITAT OF SPECIAL ANIMAL LIFE
- UPD- Utah Prairie Dog
- DT- Desert Tortoise Concentration
- F- Threatened or Endangered Fish
- G- Gila Monster
- R- Raptor Concentration Area
- BF- Potential Black-footed Ferret
- BT- Bendire's Thrasher and Gilded Flicker
- WH- Wild Horses
- WB- Wild Burros
- U- Species
- WF- Water Fowl

IMPORTANT GAME HABITAT
- D- Critical Deer Range
- B- Desert Bighorn Sheep Range
- PB- Potential Desert Bighorn Sheep Range
- S- Sage Grouse Concentration Area
- P- Pheasant Habatat

CULTURAL RESOURCES: NUMBER OF SITES
- ( ) Eligible for National Register

PALEONTOLOGICAL RESOURCES
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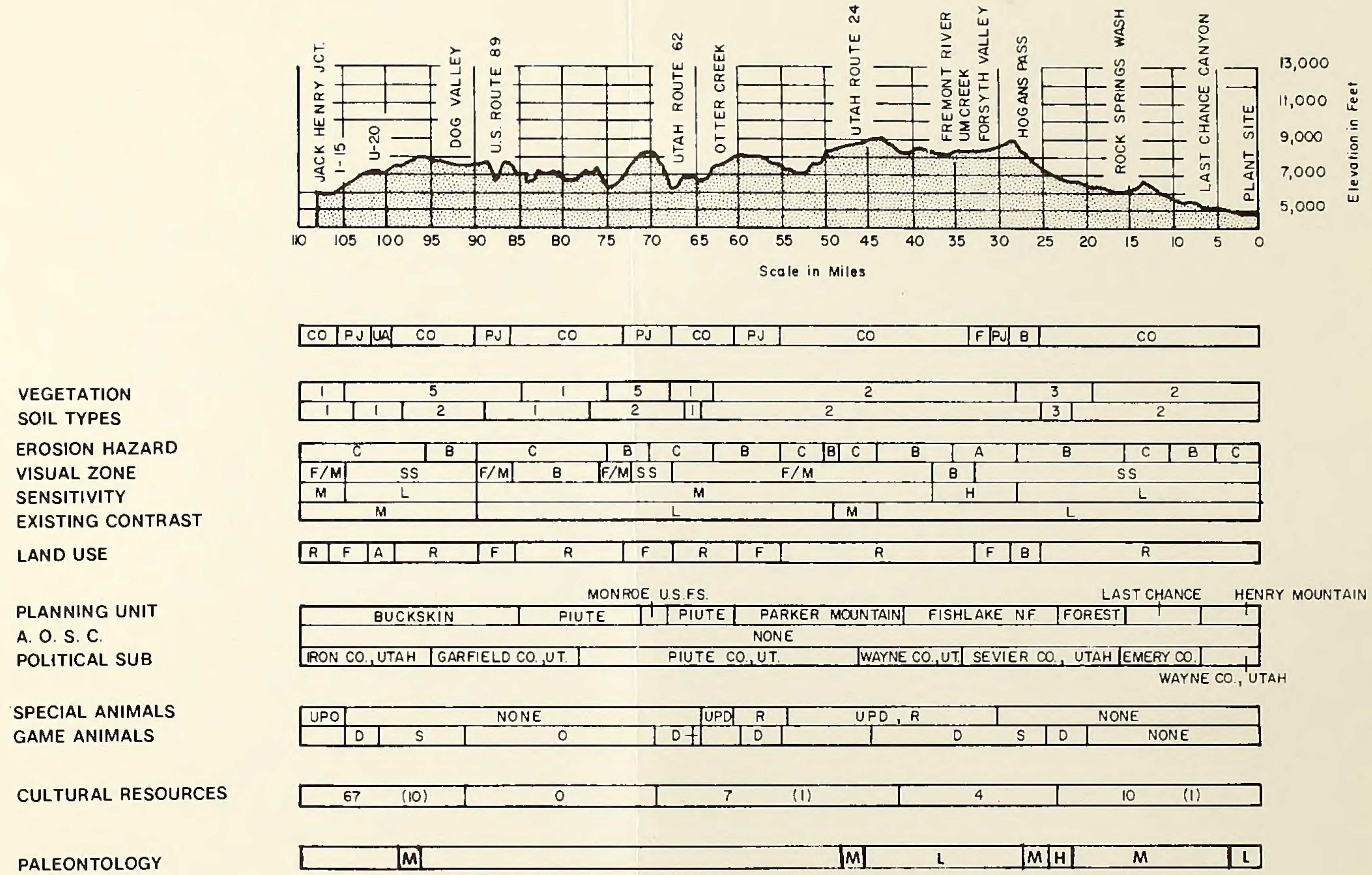
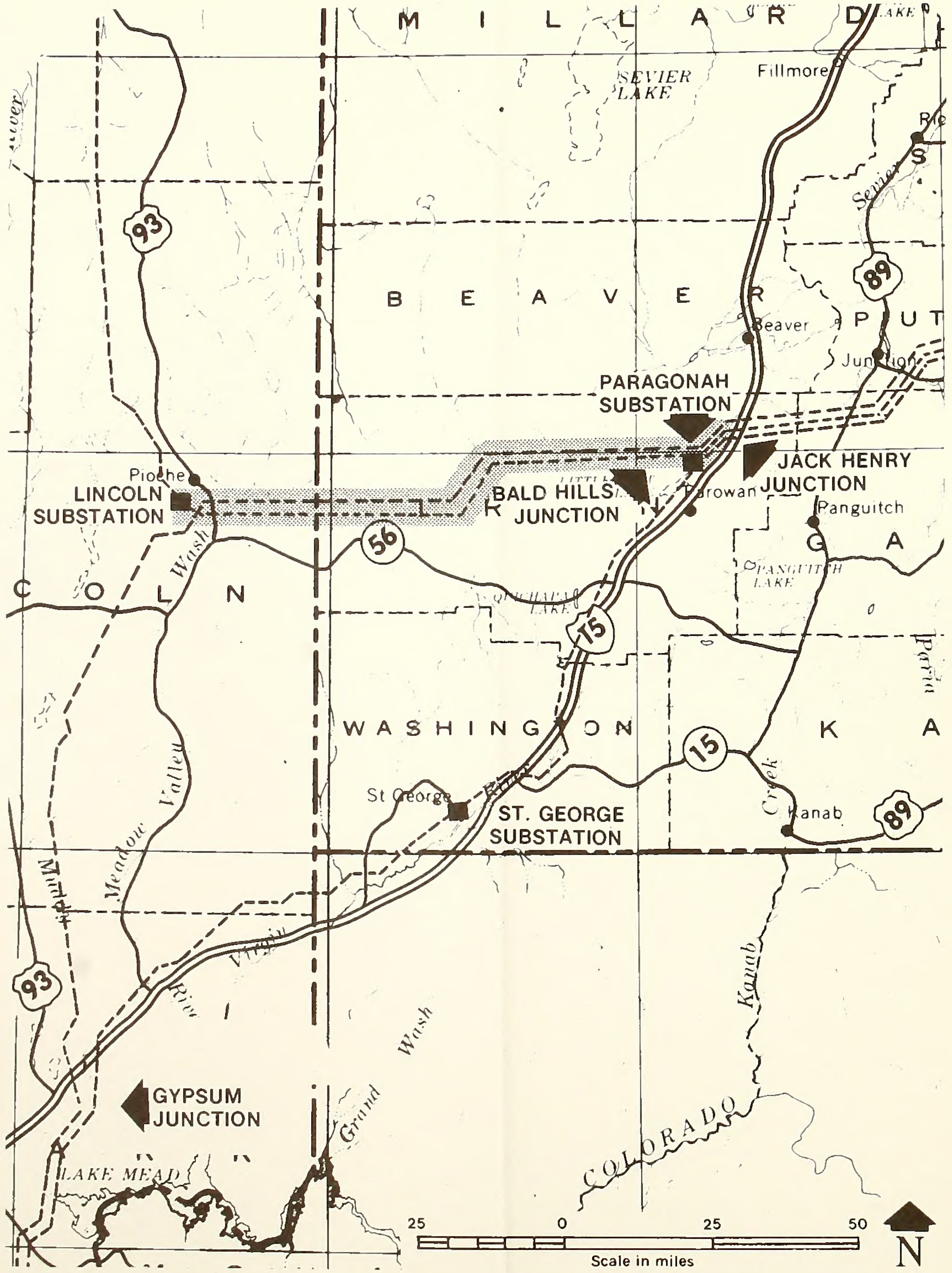


ENVIRONMENTAL PROFILE: SOUTHERN CALIFORNIA TRANSMISSION SYSTEM

PLANT SITE TO JACK HENRY JCT.

FIGURE 2-B



LEGEND

VEGETATION
- F- Forest
- MB- Mountain Brush
- PJ- Pinyon Juniper
- CD- Cold Desert Shrub
- HD-J Joshua Tree Forest
- C- Chaparral
- B- Barren
- R- Riparian
- UA- Urban Agriculture
- HD- Hot Desert Shrub

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- 3- Shallow, Rocky
- 4- Desert
- 5- Mountain and Foothills

EROSION HAZARD
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VISUAL FEATURES

SCENIC QUALITY
- A- High
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VISUAL ZONES
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- B- Background
- SS- Seldom Seen

SENSITIVITY
- H- High
- M- Medium
- L- Low

EXISTING MANMADE CONTRAST
- H- High
- M- Medium
- L- Low

LAND USE
- R- Open Range
- F- Forest
- U- Urban
- A- Agriculture
- B- Barren

PLANNING UNIT BY NAME

AREAS OF SPECIAL CONCERN (AOSC)
- U-LD-Urban Low Density
- Ag- Agriculture
- R-II- U.S. Forest Service Rare II Wilderness Recommendation
- WSA- BLM Wilderness Study Area
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- Others- By Name

POLITICAL SUBDIVISIONS BY NAME

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- U- Species
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- PB- Potential Desert Bighorn Sheep Range
- S- Sage Grouse Concentration Area
- P- Pheasant Habatat

CULTURAL RESOURCES: NUMBER OF SITES
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PALEONTOLOGICAL RESOURCES
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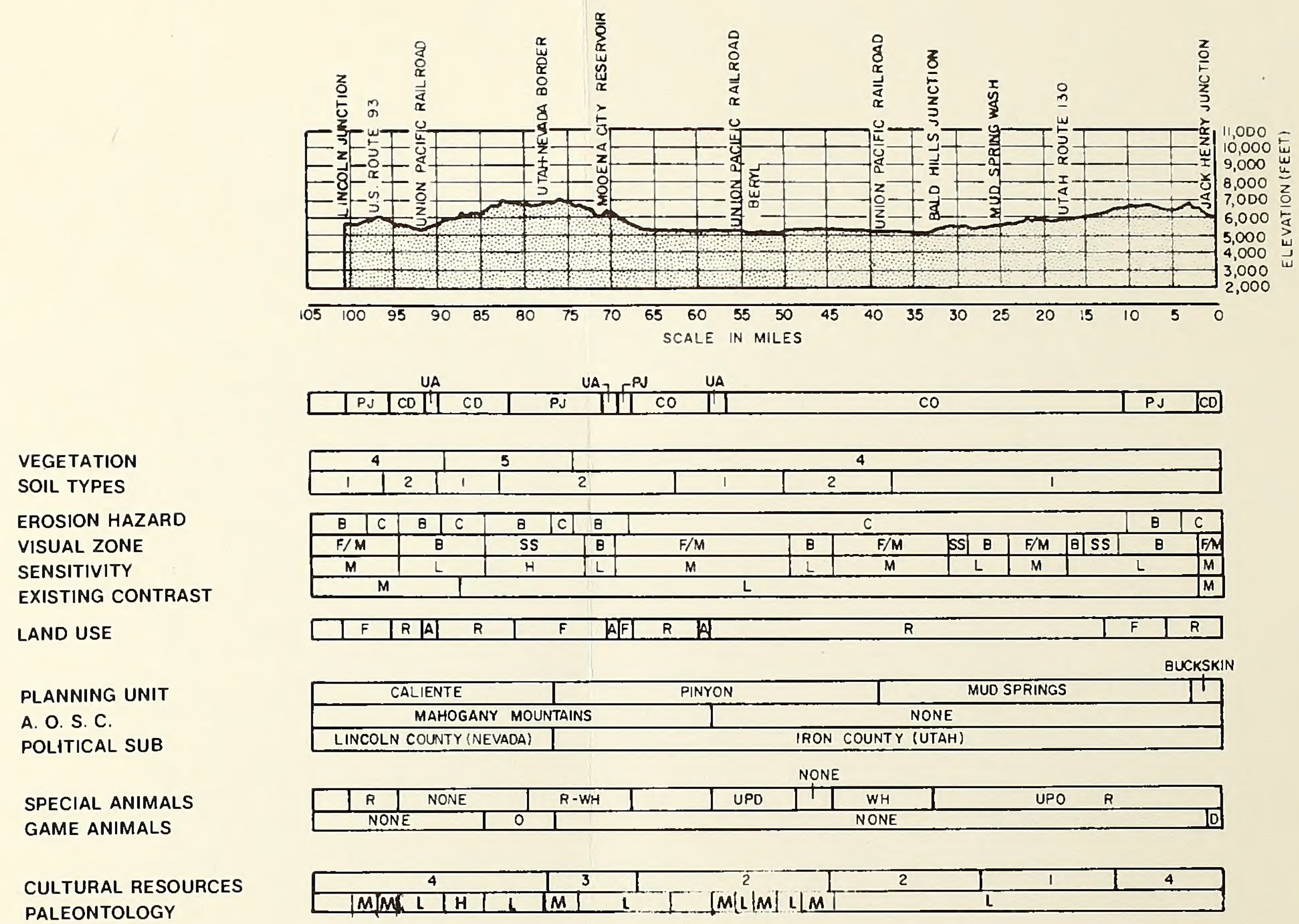
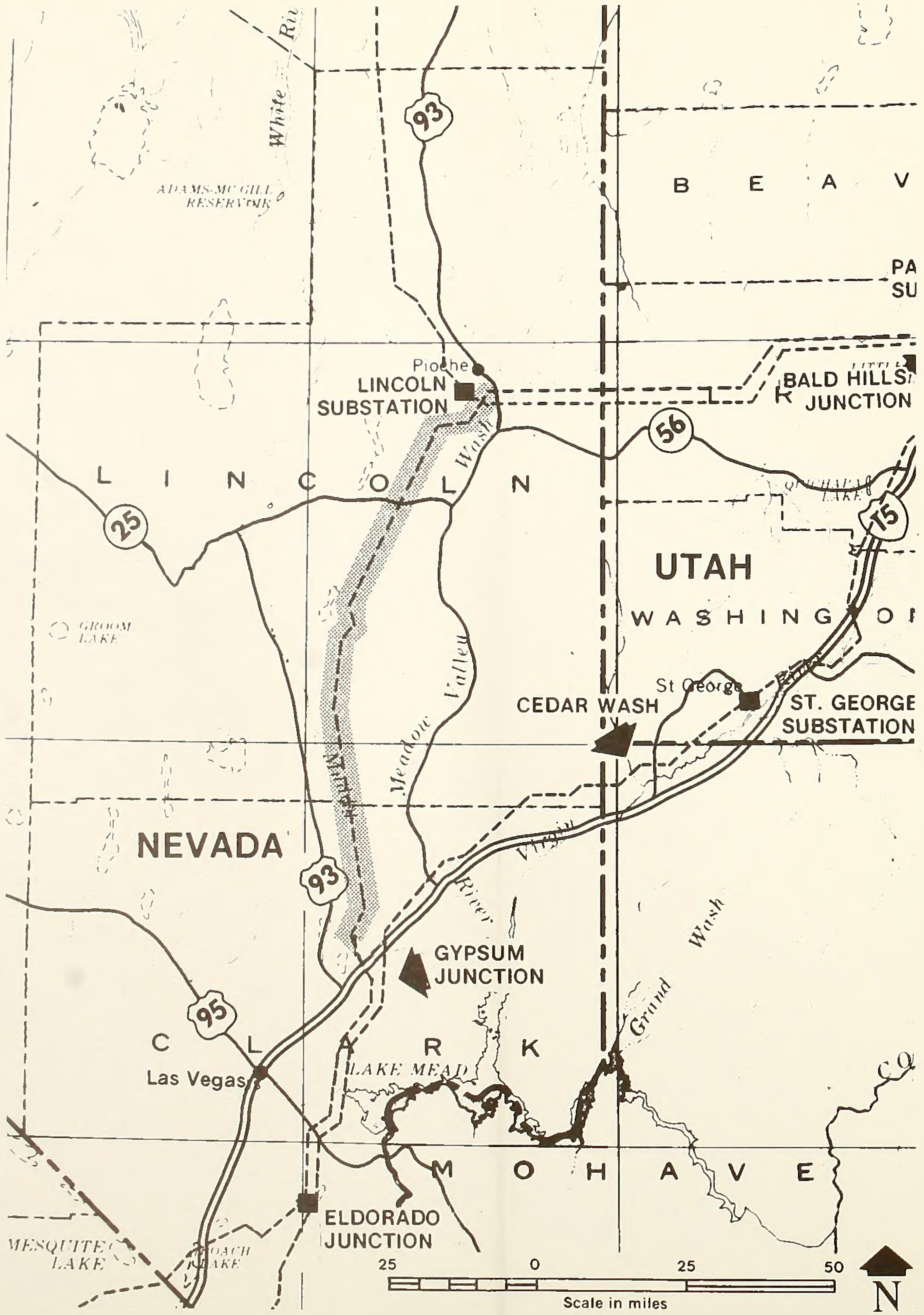


ENVIRONMENTAL PROFILE: SOUTHERN CALIFORNIA TRANSMISSION SYSTEM

JACK HENRY JUNCTION TO LINCOLN JUNCTION

FIGURE 2-C



LEGEND

VEGETATION
- F- Forest
- MB- Mountain Brush
- PJ- Pinyon Juniper
- CO- Cold Desert Shrub
- HO-J Joshua Tree Forest
- C- Chaparral
- B- Barren
- R- Riparian
- UA- Urban Agriculture
- HO- Hot Desert Shrub

SOIL TYPE
- 1- Deep Alluvial Valley
- 2- Shallow, Shale-Clay
- 3- Shallow, Rocky
- 4- Desert
- 5- Mountain and Foothills

EROSION HAZARD
- 1- Slight-Moderate
- 2- Moderate-High
- 3- Severe

VISUAL FEATURES

SCENIC QUALITY
- A- High
- B- Medium
- C- Low

VISUAL ZONES
- F/M- Foreground/Middleground
- B- Background
- SS- Seldom Seen

SENSITIVITY
- H- High
- M- Medium
- L- Low

EXISTING MANMADE CONTRAST
- H- High
- M- Medium
- L- Low

LAND USE
- R- Open Range
- F- Forest
- U- Urban
- A- Agriculture
- B- Barren

PLANNING UNIT BY NAME

AREAS OF SPECIAL CONCERN (AOSC)
- U-LO-Urban Low Density
- Ag- Agriculture
- R-II- U.S. Forest Service Rare II Wilderness Recommendation
- WSA-BLM Wilderness Study Area
- RA- BLM Uninventoried Roadless Area
- Others- By Name

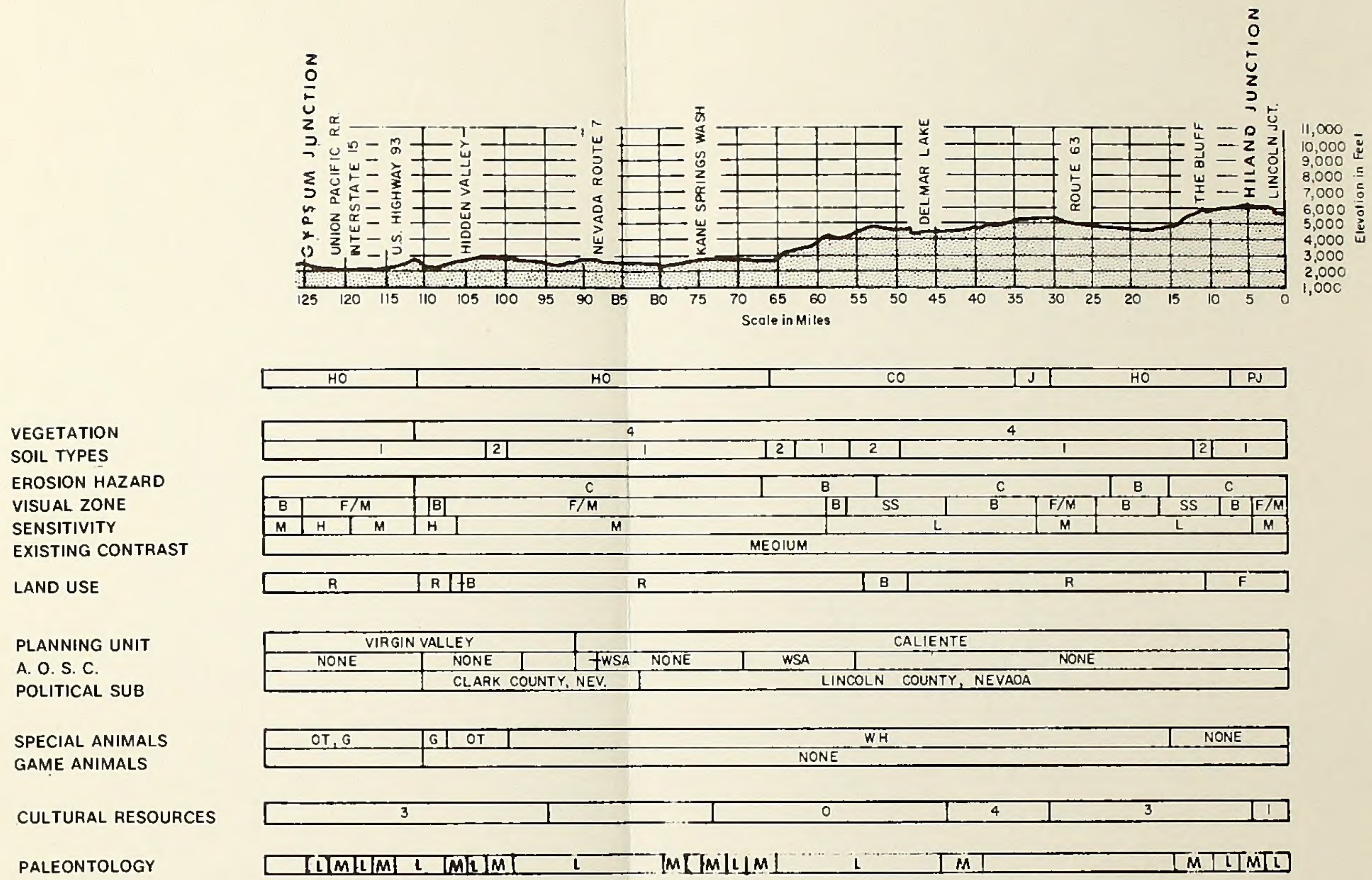
POLITICAL SUBDIVISIONS BY NAME

HABITAT OF SPECIAL ANIMAL LIFE
- UPD- Utah Prairie Dog
- DT- Desert Tortoise Concentration
- F- Threatened or Endangered Fish
- G- Gila Monster
- R- Raptor Concentration Area
- BF- Potential Black-footed Ferret
- BT- Bendire's Thrasher and Gilded Flicker
- WH- Wild Horses
- WB- Wild Burros
- U- Species
- WF- Water Fowl

IMPORTANT GAME HABITAT
- D- Critical Deer Range
- B- Desert Bighorn Sheep Range
- PB- Potential Desert Bighorn Sheep Range
- S- Sage Grouse Concentration Area
- P- Pheasant Habitat

CULTURAL RESOURCES: NUMBER OF SITES
- ( ) Eligible for National Register

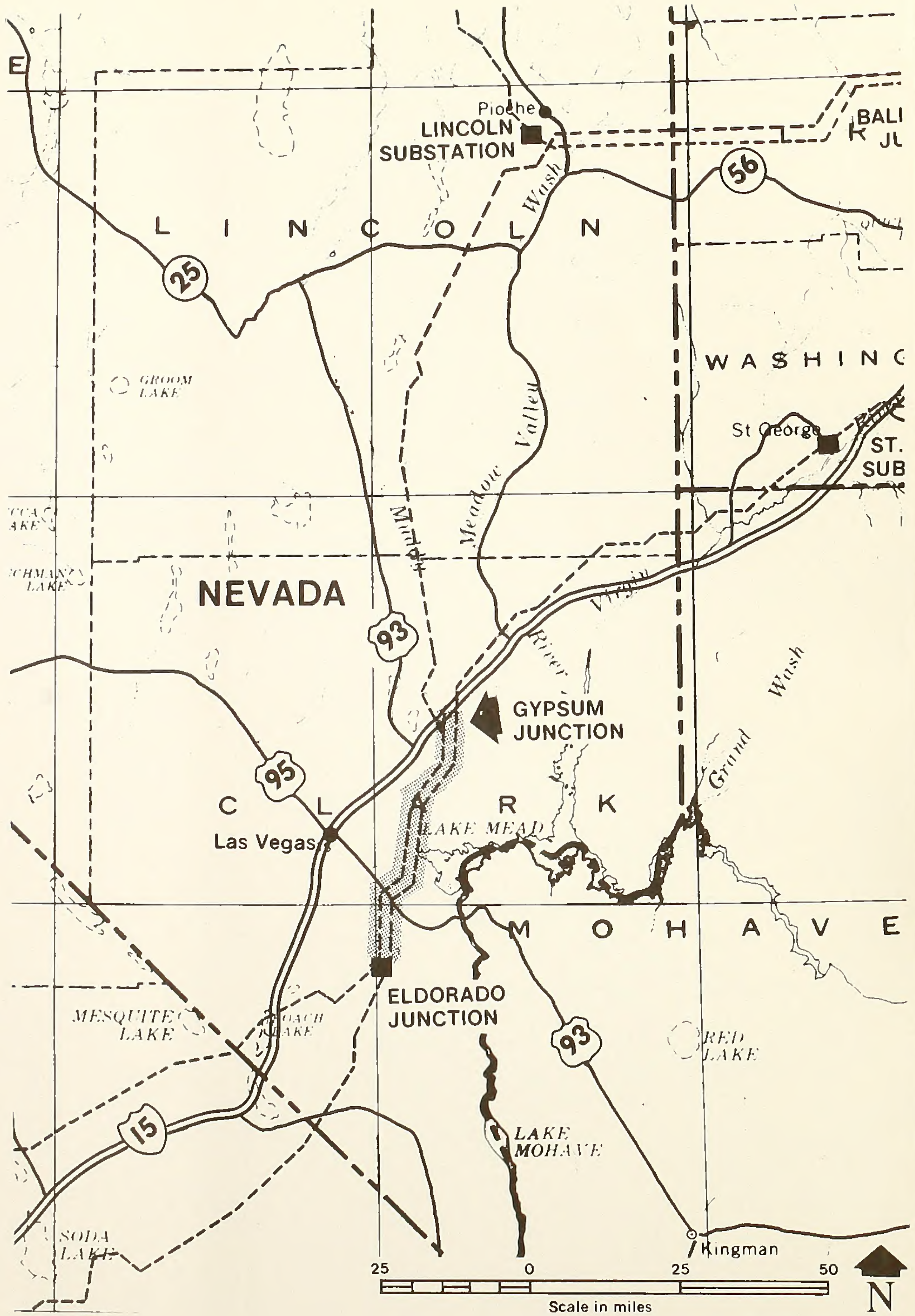
PALEONTOLOGICAL RESOURCES
- H- Potentially High Paleontological Significance
- M- Potentially Medium Paleontological Significance
- L- Low Paleontological Significance



ENVIRONMENTAL PROFILE: SOUTHERN CALIFORNIA TRANSMISSION SYSTEM

LINCOLN JUNCTION TO GYPSUM JUNCTION

FIGURE 2-D



LEGEND

VEGETATION
- F- Forest
- MB- Mountain Brush
- PJ- Pinyon Juniper
- CD- Cold Oesert Shrub
- HD-J Joshua Tree Forest
- C- Chaparral
- B- Barren
- R- Riparian
- UA- Urban Agriculture
- HD- Hot Desert Shrub

SOIL TYPE
- 1- Deep Alluvial Valley
- 2- Shallow, Shale-Clay
- 3- Shallow, Rocky
- 4- Desert
- 5- Mountain and Foothills

ERDSION HAZARD
- 1- Slight-Moderate
- 2- Moderate-High
- 3- Severe

VISUAL FEATURES

SCENIC DUALITY
- A- High
- B- Medium
- C- Low

VISUAL ZONES
- F/M- Foreground/Middleground
- B- Background
- SS- Seldom Seen

SENSITIVITY
- H- High
- M- Medium
- L- Low

EXISTING MANMADE CONTRAST
- H- High
- M- Medium
- L- Low

LAND USE
- R- Open Range
- F- Forest
- U- Urban
- A- Agriculture
- B- Barren

PLANNING UNIT BY NAME

AREAS DF SPECIAL CONCERN (AOSC)
- U-LD-Urban Low Density
- Ag- Agriculture
- R-II- U.S. Forest Service Rare II Wilderness Recommendation
- WSA-BLM Wilderness Study Area
- RA- BLM Uninventoried Roadless Area
- Others- By Name

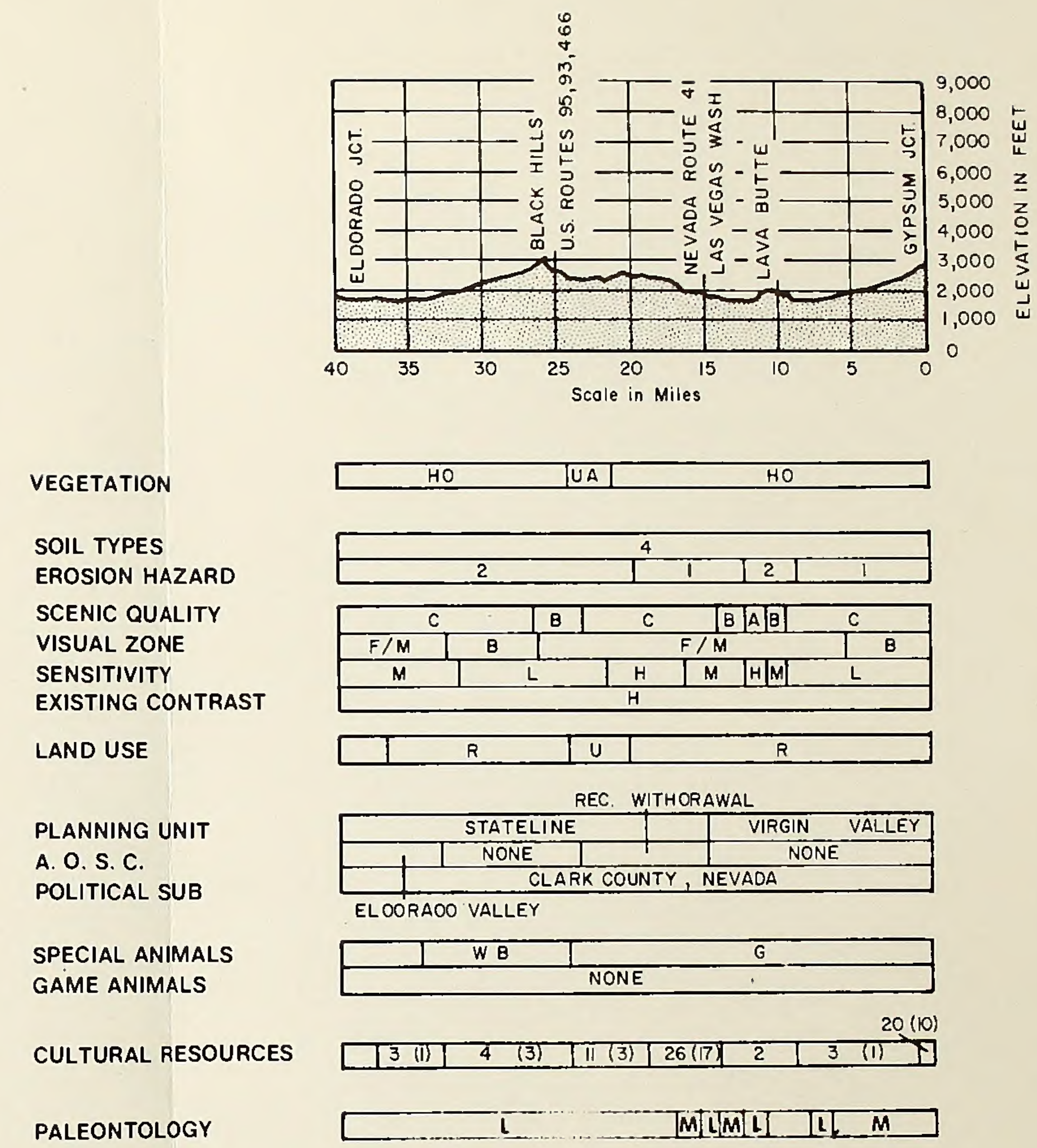
POLITICAL SUBDIVISIONS BY NAME

HABITAT OF SPECIAL ANIMAL LIFE
- UPD- Utah Prairie Dog
- DT- Desert Tortoise Concentration
- F- Threatened or Endangered Fish
- G- Gila Monster
- R- Raptor Concentration Area
- BF- Potential Black-tooted Ferret
- BT- Bendire's Thrasher and Gilded Flicker
- WH- Wild Horses
- WB- Wild Burros
- U- Species
- WF- Water Fowl

IMPDRTANT GAME HABITAT
- D- Critical Deer Range
- B- Oesert Bighorn Sheep Range
- PB- Potential Oesert Bighorn Sheep Range
- S- Sage Grouse Concentration Area
- P- Pheasant Habatat

CULTURAL RESOURCES: NUMBER OF SITES
- ( ) Eligible for National Register

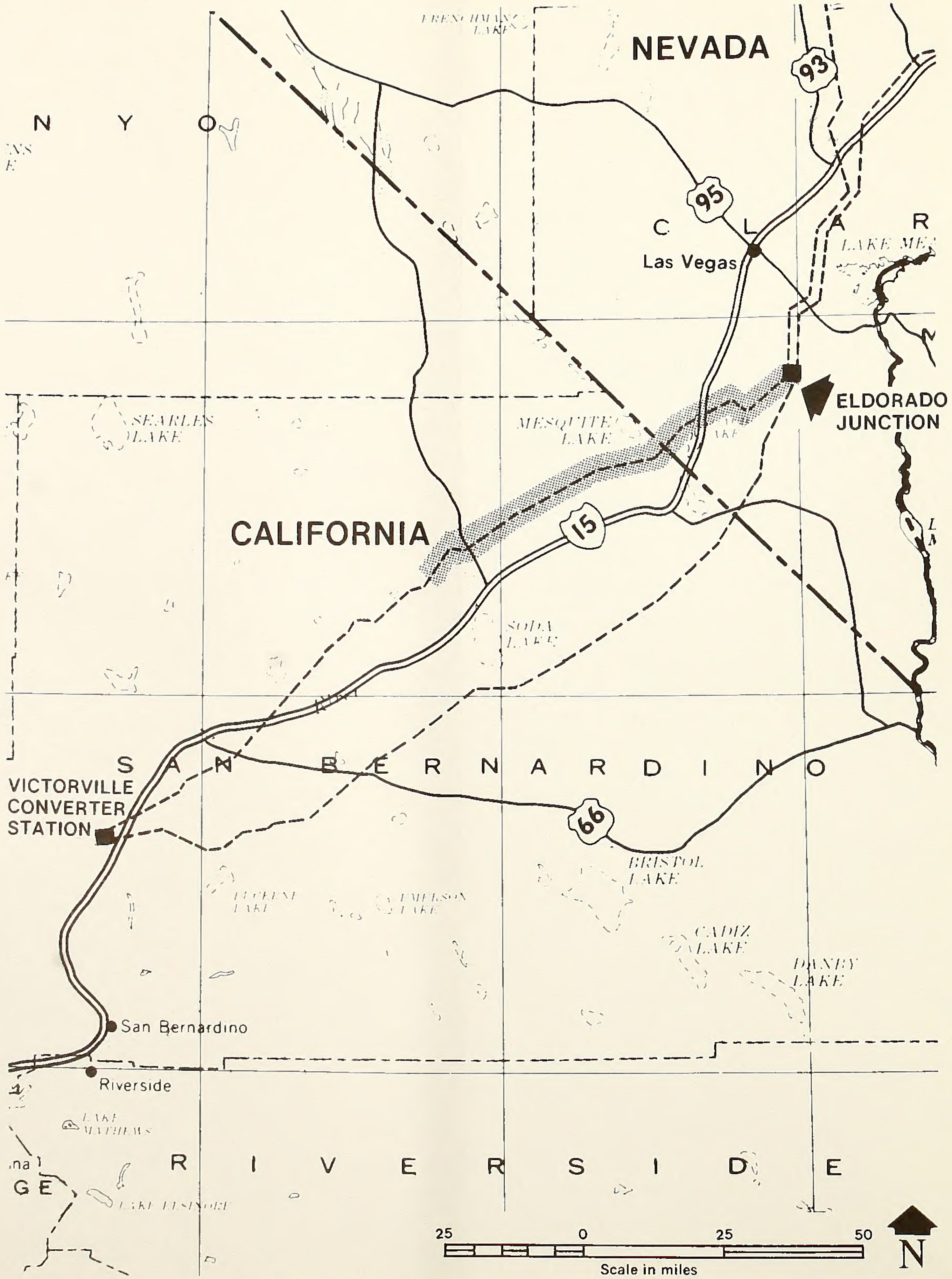
PALEONTOLOGICAL RESOURCES
- H- Potentially High Paleontological Significance
- M- Potentially Medium Paleontological Significance
- L- Low Paleontological Significance



ENVIRONMENTAL PROFILE: SOUTHERN CALIFORNIA TRANSMISSION SYSTEM

GYPSUM JUNCTION TO ELDORADO JUNCTION

FIGURE 2-E



LEGEND

VEGETATION
- F- Forest
- MB- Mountain Brush
- PJ- Pinyon Juniper
- CD- Cold Deserl Shrub
- HD-J Joshua Tree Foresl
- C- Chaparral
- B- Barren
- R- Riparian
- UA- Urban Agriculture
- HD- Hol Desert Shrub

SOIL TYPE
- 1- Deep Alluvial Valley
- 2- Shallow, Shale-Clay
- 3- Shallow, Rocky
- 4- Desert
- 5- Mounlain and Foolhills

EROSION HAZARD
- 1- Slight-Moderale
- 2- Moderale-High
- 3- Severe

VISUAL FEATURES

SCENIC QUALITY
- A- High
- B- Medium
- C- Low

VISUAL ZONES
- F/M- Foreground/Middleground
- B- Background
- SS- Seldom Seen

SENSITIVITY
- H- High
- M- Medium
- L- Low

EXISTING MANMADE CONTRAST
- H- High
- M- Medium
- L- Low

LAND USE
- R- Open Range
- F- Forest
- U- Urban
- A- Agriculture
- B- Barren

PLANNING UNIT BY NAME

AREAS OF SPECIAL CONCERN (AOSC)
- U-LD- Urban Low Density
- Ag- Agriculture
- R-II- U.S. Forest Service Rare II Wilderness Recommendalion
- WSA- BLM Wilderness Sludy Area
- RA- BLM Uninvenloried Roadless Area
- Others- By Name

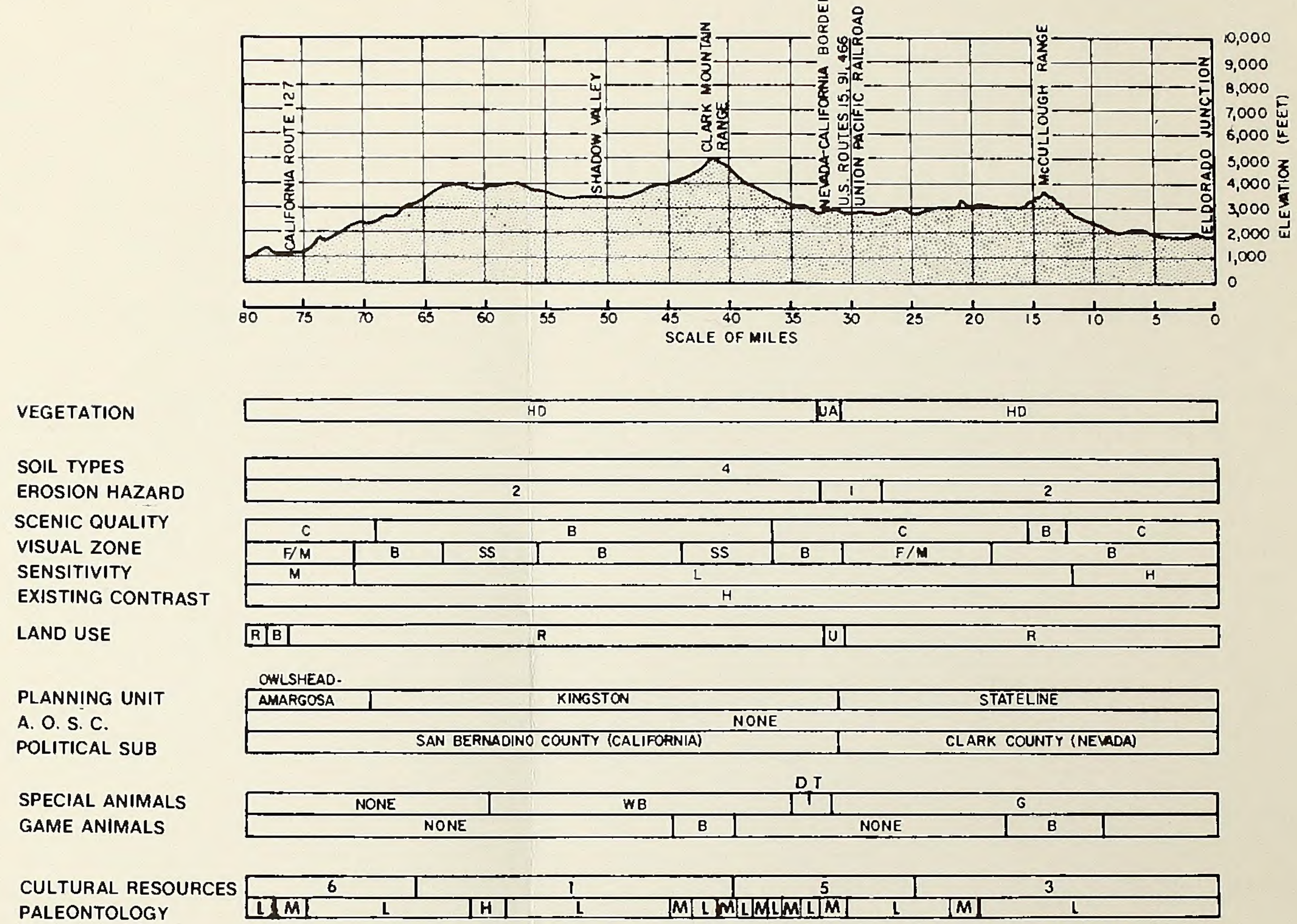
POLITICAL SUBDIVISIONS BY NAME

HABITAT OF SPECIAL ANIMAL LIFE
- UPD- Utah Prairie Dog
- DT- Desert Tortoise Concentration
- F- Threalened or Endangered Fish
- G- Gila Monster
- R- Raptor Concentration Area
- BF- Potential Black-footed Ferrel
- BT- Bendire's Thrasher and Gilded Flicker
- WH- Wild Horses
- WB- Wild Burros
- U- Species
- WF- Water Fowl

IMPORTANT GAME HABITAT
- D- Crilical Deer Range
- B- Desert Bighorn Sheep Range
- PB- Potential Desert Bighorn Sheep Range
- S- Sage Grouse Concentration Area
- P- Pheasant Habatat

CULTURAL RESOURCES: NUMBER OF SITES
- ( ) Eligible for National Regisler

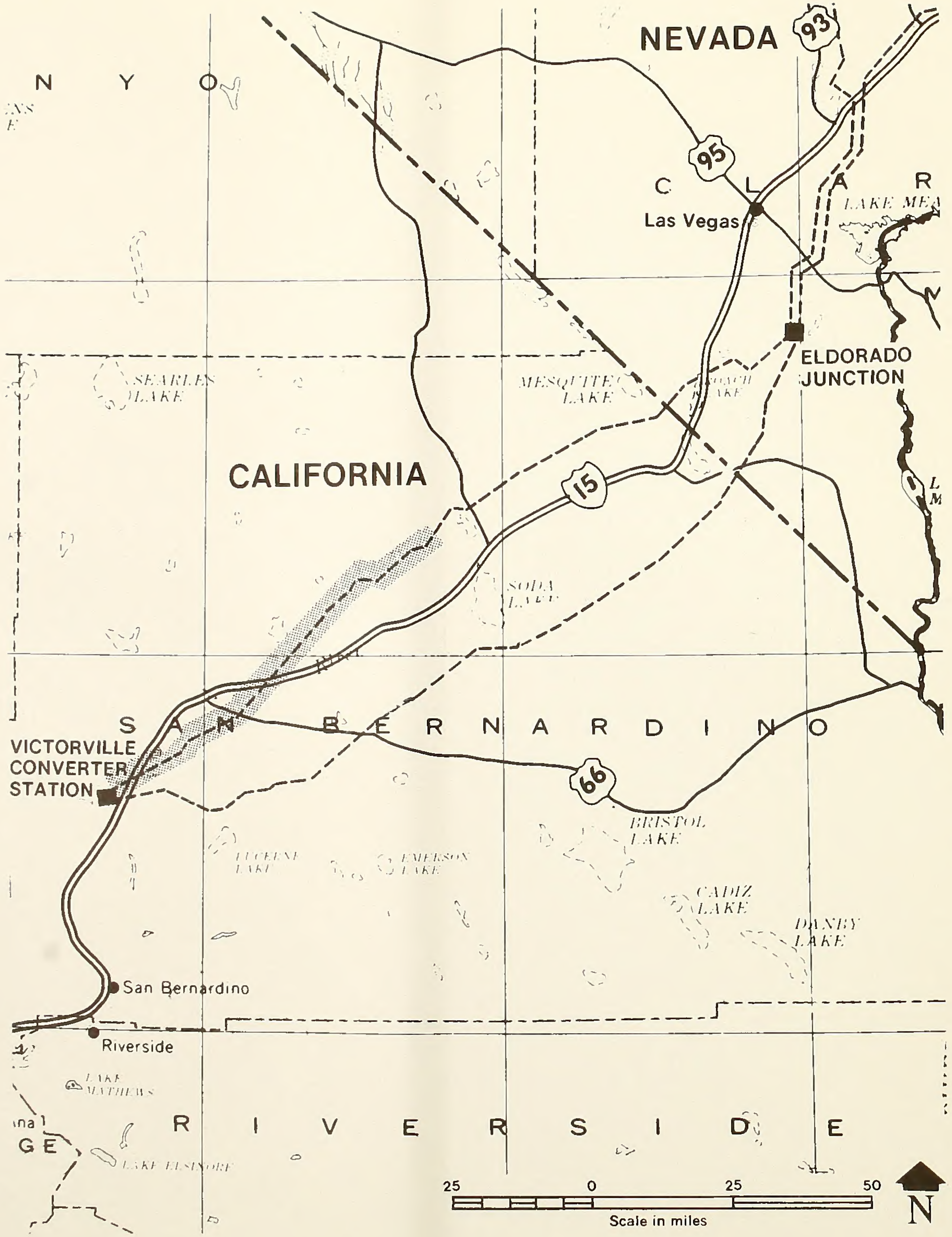
PALEONTOLOGICAL RESOURCES
- H- Potentially High Paleontological Significance
- M- Potentially Medium Paleontological Significance
- L- Low Paleontological Significance



ENVIRONMENTAL PROFILE: SOUTHERN CALIFORNIA TRANSMISSION SYSTEM

ELDORADO JUNCTION TO VICTORVILLE Line 1, Part 1

FIGURE 2-F



LEGEND

VEGETATION
- F- Forest
- MB- Mountain Brush
- PJ- Pinyon Juniper
- CD- Cold Desert Shrub
- HD-J Joshua Tree Forest
- C- Chaparral
- B- Barren
- R- Riparian
- UA- Urban Agriculture
- HD- , Hot Desert Shrub

SOIL TYPE
- 1- Deep Alluvial Valley
- 2- Shallow, Shale-Clay
- 3- Shallow, Rocky
- 4- Desert
- 5- Mountain and Foothills

EROSION HAZARD
- 1- Slight-Moderate
- 2- Moderate-High
- 3- Severe

VISUAL FEATURES

SCENIC QUALITY
- A- High
- B- Medium
- C- Low

VISUAL ZONES
- F/M- Foreground/Middleground
- B- Background
- SS- Seldom Seen

SENSITIVITY
- H- High
- M- Medium
- L- Low

EXISTING MANMADE CONTRAST
- H- High
- M- Medium
- L- Low

LAND USE
- R- Open Range
- F- Forest
- U- Urban
- A- Agriculture
- B- Barren

PLANNING UNIT BY NAME

AREAS OF SPECIAL CONCERN (AOSC)
- U-LD-Urban Low Density
- Ag- Agriculture
- R-II- U.S. Forest Service Rare II Wilderness Recommendation
- WSA-BLM Wilderness Study Area
- RA- BLM Uninventoried Roadless Area
- Others- By Name

POLITICAL SUBDIVISIONS BY NAME

HABITAT OF SPECIAL ANIMAL LIFE
- UPD- Utah Prairie Dog
- DT- Desert Tortoise Concentration
- F- Threatened or Endangered Fish
- G- Gila Monster
- R- Raptor Concentration Area
- BF- Potential Black-footed Ferret
- BT- Bendire's Thrasher and Gilded Flicker
- WH- Wild Horses
- WB- Wild Burros
- U- Species
- WF- Water Fowl

IMPORTANT GAME HABITAT
- D- Critical Deer Range
- B- Desert Bighorn Sheep Range
- PB- Potential Desert Bighorn Sheep Range
- S- Sage Grouse Concentration Area
- P- Pheasant Habatat

CULTURAL RESOURCES: NUMBER OF SITES
- ( ) Eligible for National Register

PALEONTOLOGICAL RESOURCES
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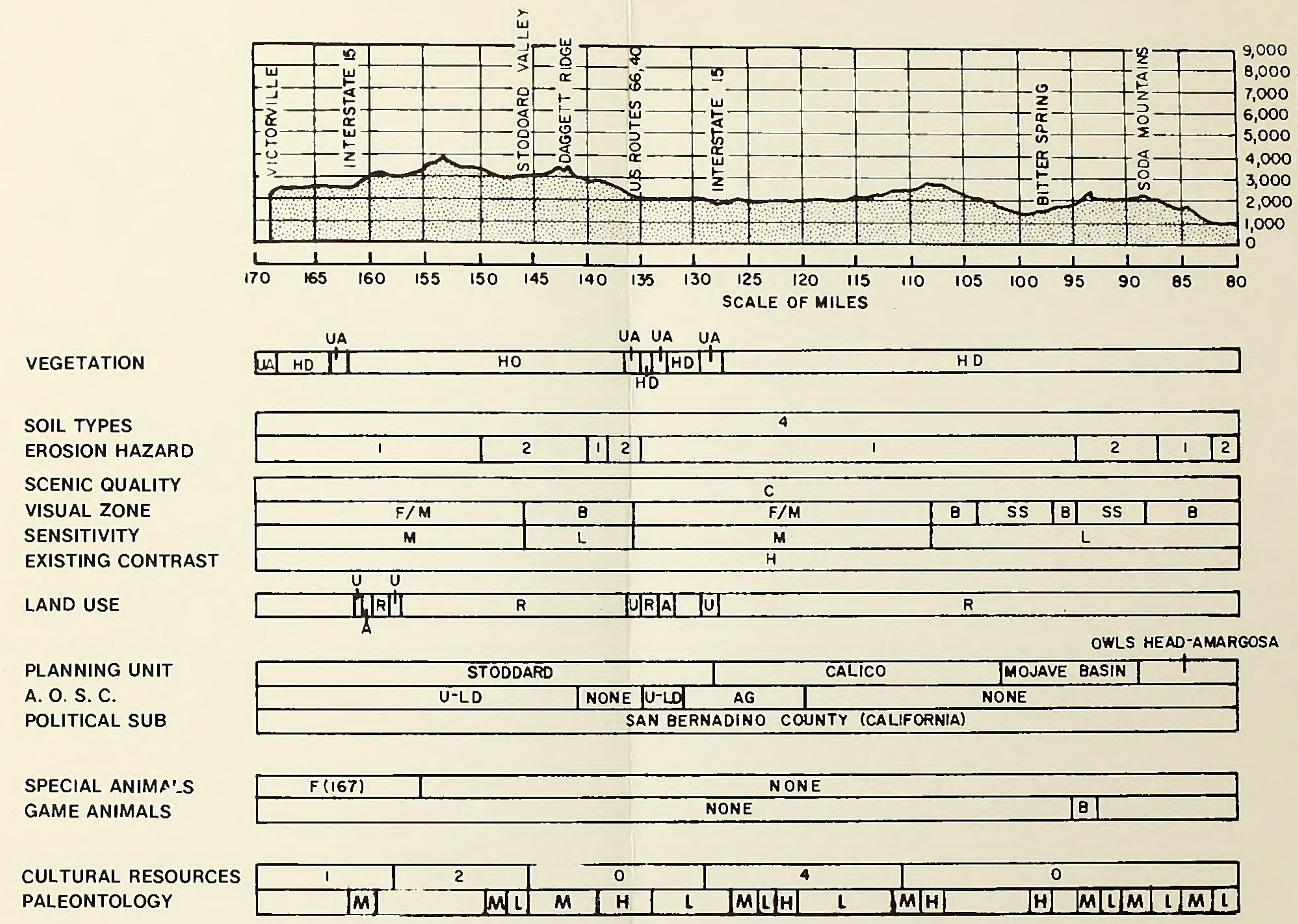
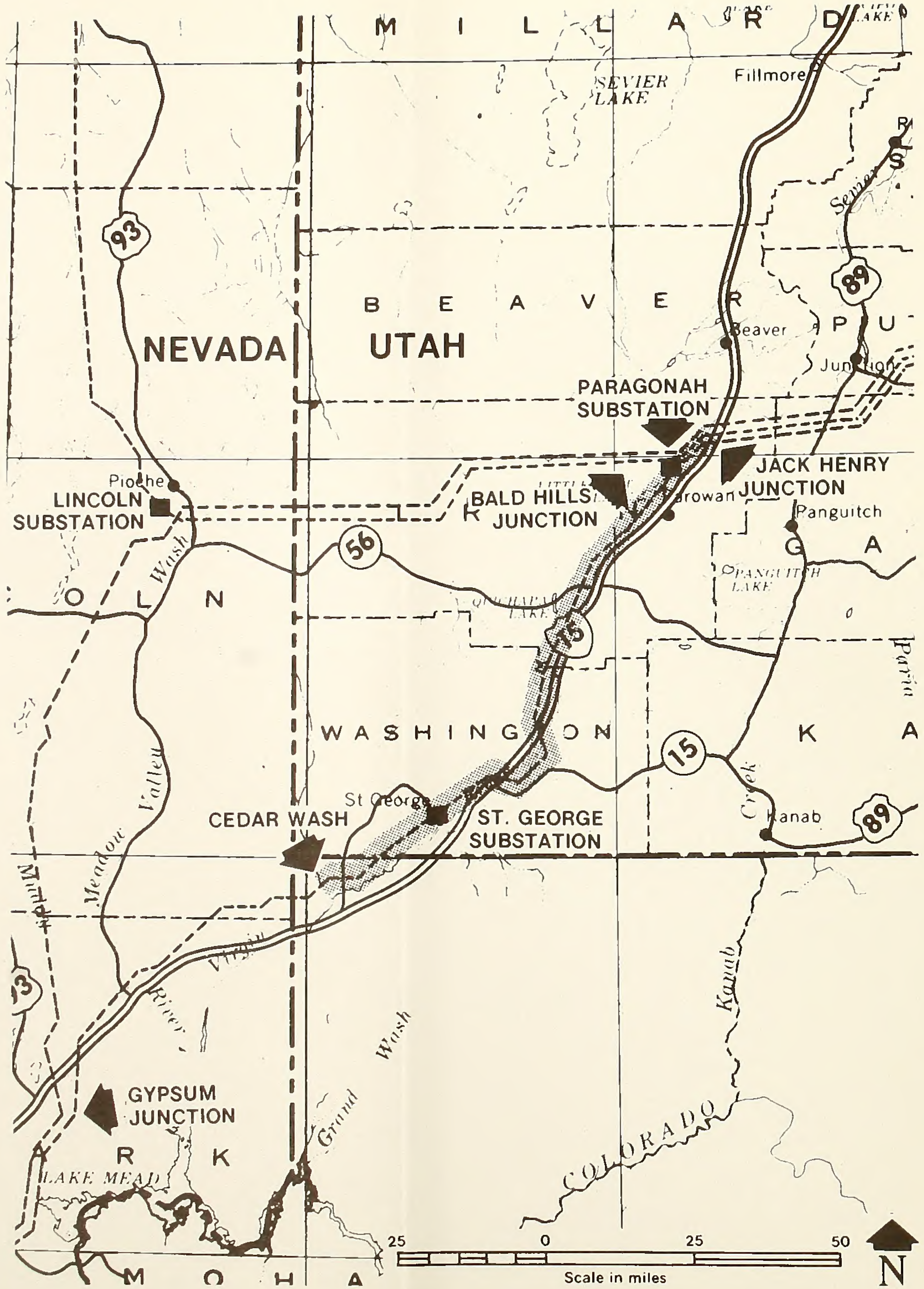


ENVIRONMENTAL PROFILE: SOUTHERN CALIFORNIA TRANSMISSION SYSTEM

ELDORADO JUNCTION TO VICTORVILLE
Line 1, Part 2

FIGURE 2-G



LEGEND

VEGETATION
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VISUAL FEATURES

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EXISTING MANMADE CDNTRAST
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PLANNING UNIT BY NAME

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CULTURAL RESOURCES: NUMBER DF SITES
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PALEONTOLOGICAL RESOURCES
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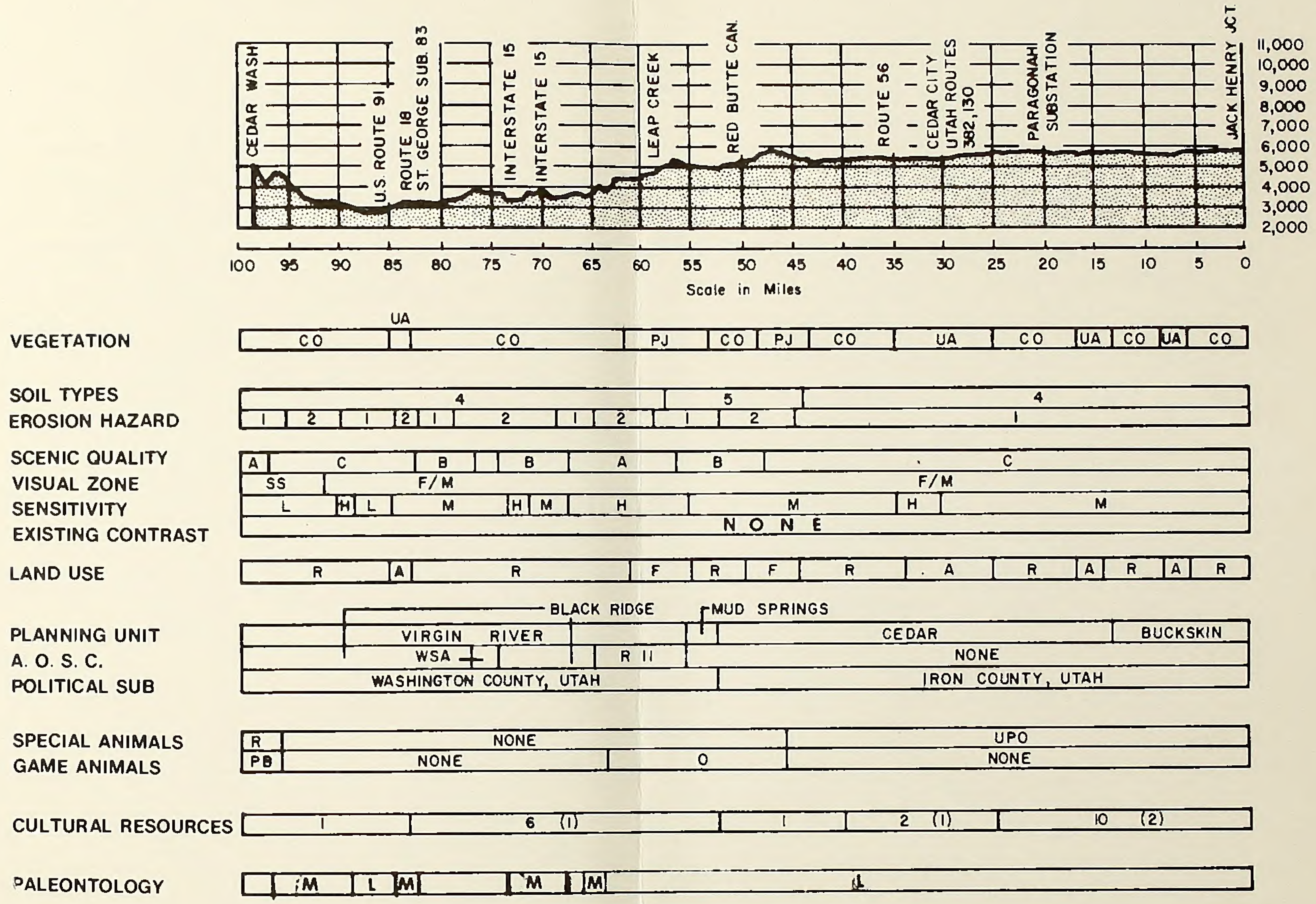
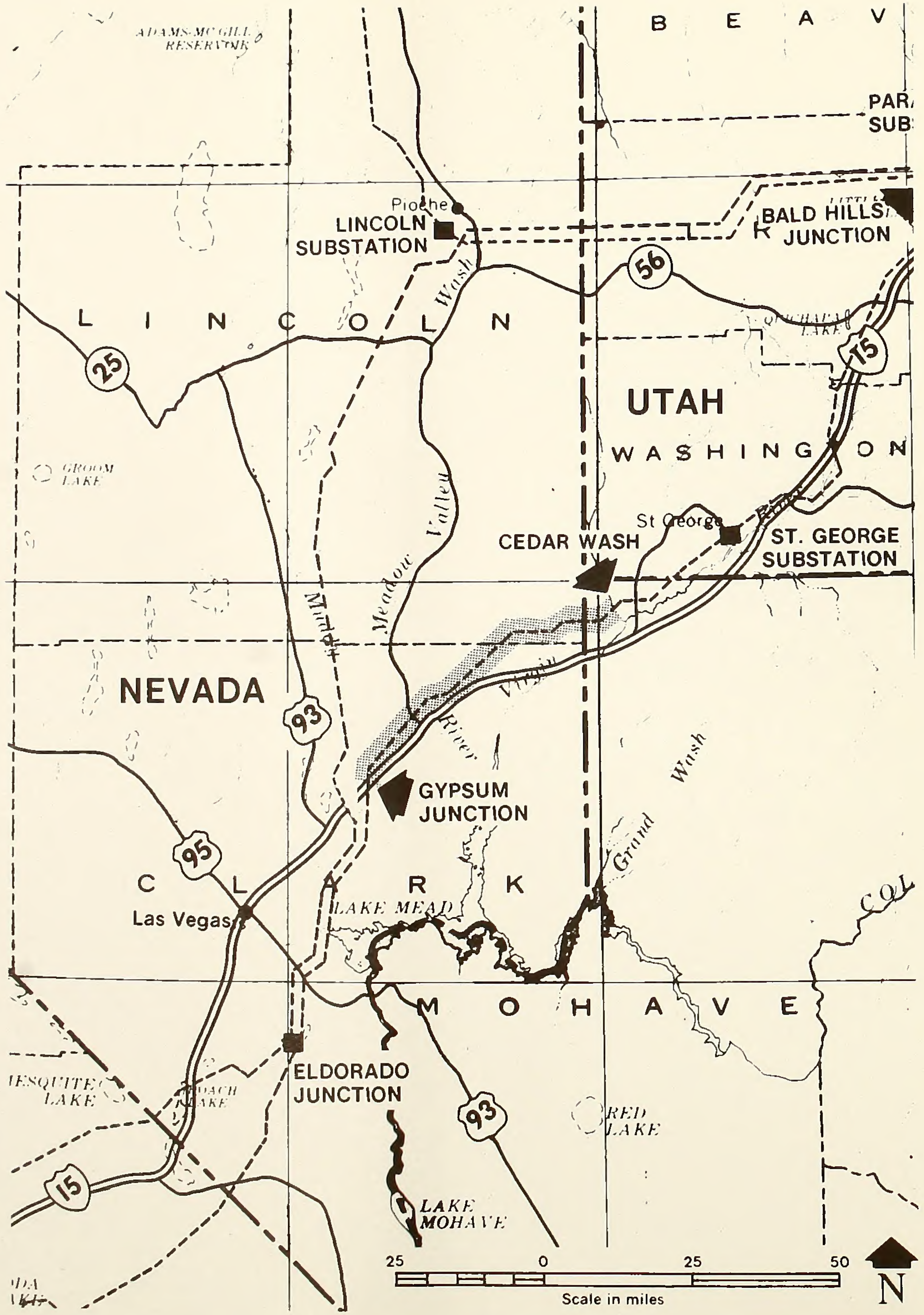


ENVIRONMENTAL PROFILE: SOUTHERN CALIFORNIA TRANSMISSION SYSTEM

JACK HENRY JUNCTION TO CEDAR WASH

FIGURE 2-H



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PLANNING UNIT BY NAME

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- WB- Wild Burros
- U- Species
- WF- Water Fowl

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- B- Desert Bighorn Sheep Range
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- P- Pheasant Habatat

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- ( ) Eligible for National Register

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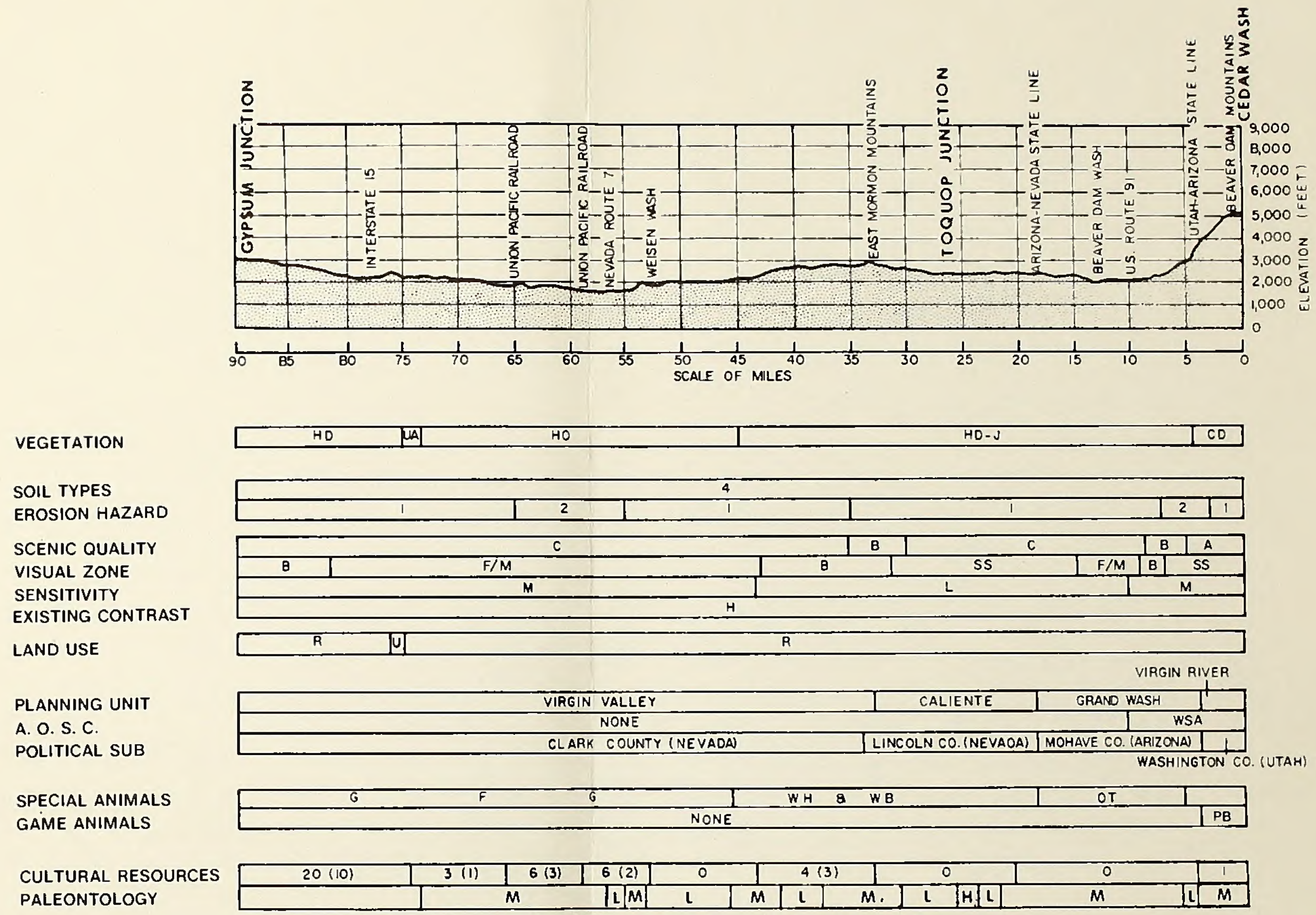
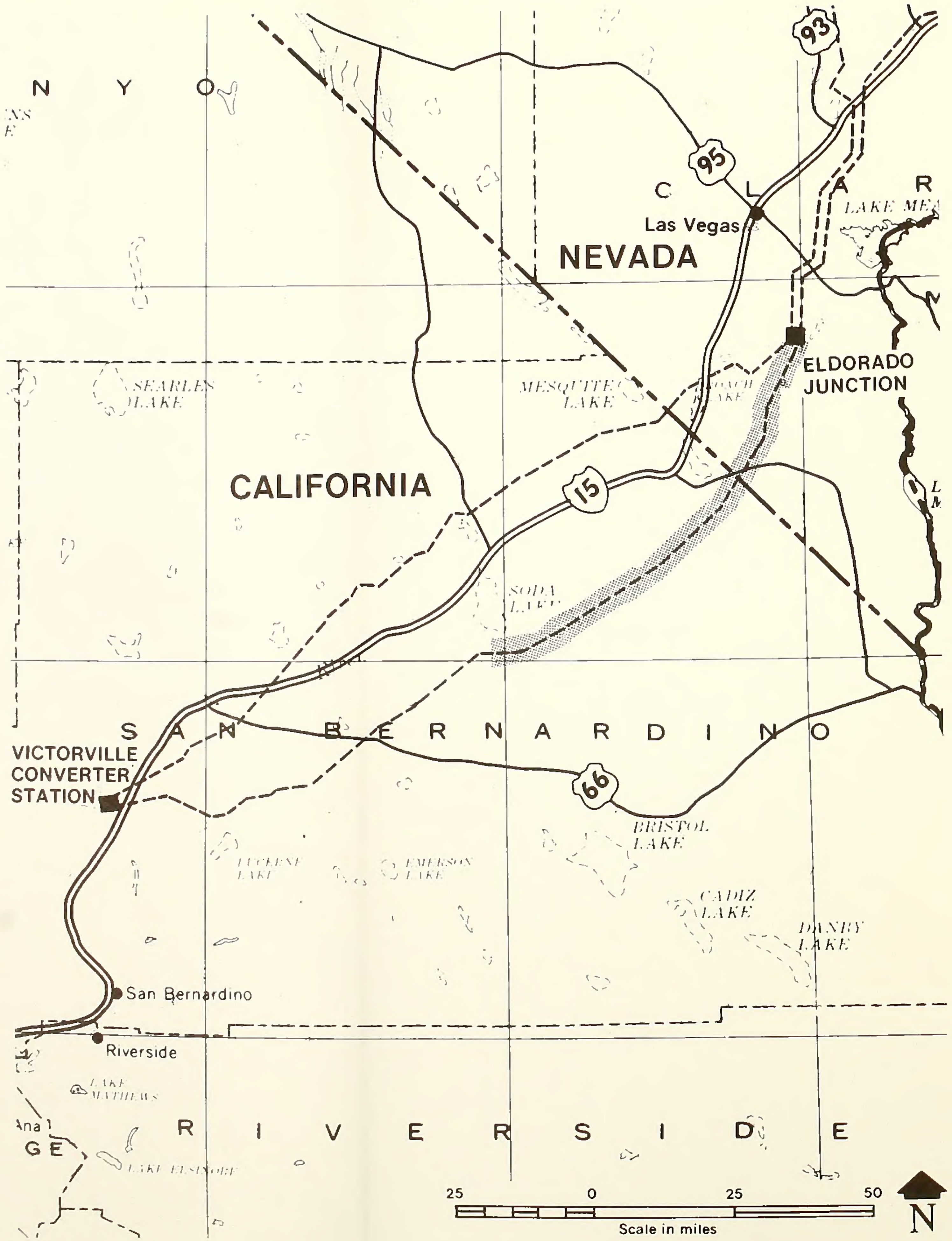
- M- Potentially Medium Paleontological Significance
- L- Low Paleontological Significance



ENVIRONMENTAL PROFILE: SOUTHERN CALIFORNIA TRANSMISSION SYSTEM

CEDAR WASH TO GYPSUM JUNCTION

FIGURE 2-1



LEGEND

VEGETATION
- F- Forest
- MB- Mountain Brush
- PJ- Pinyon Juniper
- CD- Cold Desert Shrub
- HD-J Joshua Tree Forest
- C- Chaparral
- B- Barren
- R- Riparian
- UA- Urban Agriculture
- HD- Hot Desert Shrub

SOIL TYPE
- 1- Deep Alluvial Valley
- 2- Shallow, Shale-Clay
- 3- Shallow, Rocky
- 4- Desert
- 5- Mountain and Foothills

EROSION HAZARD
- 1- Slight-Moderate
- 2- Moderate-High
- 3- Severe

VISUAL FEATURES

SCENIC QUALITY
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- B- Medium
- C- Low

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- B- Background
- SS- Seldom Seen

SENSITIVITY
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PLANNING UNIT BY NAME

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- PB- Potential Desert Bighorn Sheep Range
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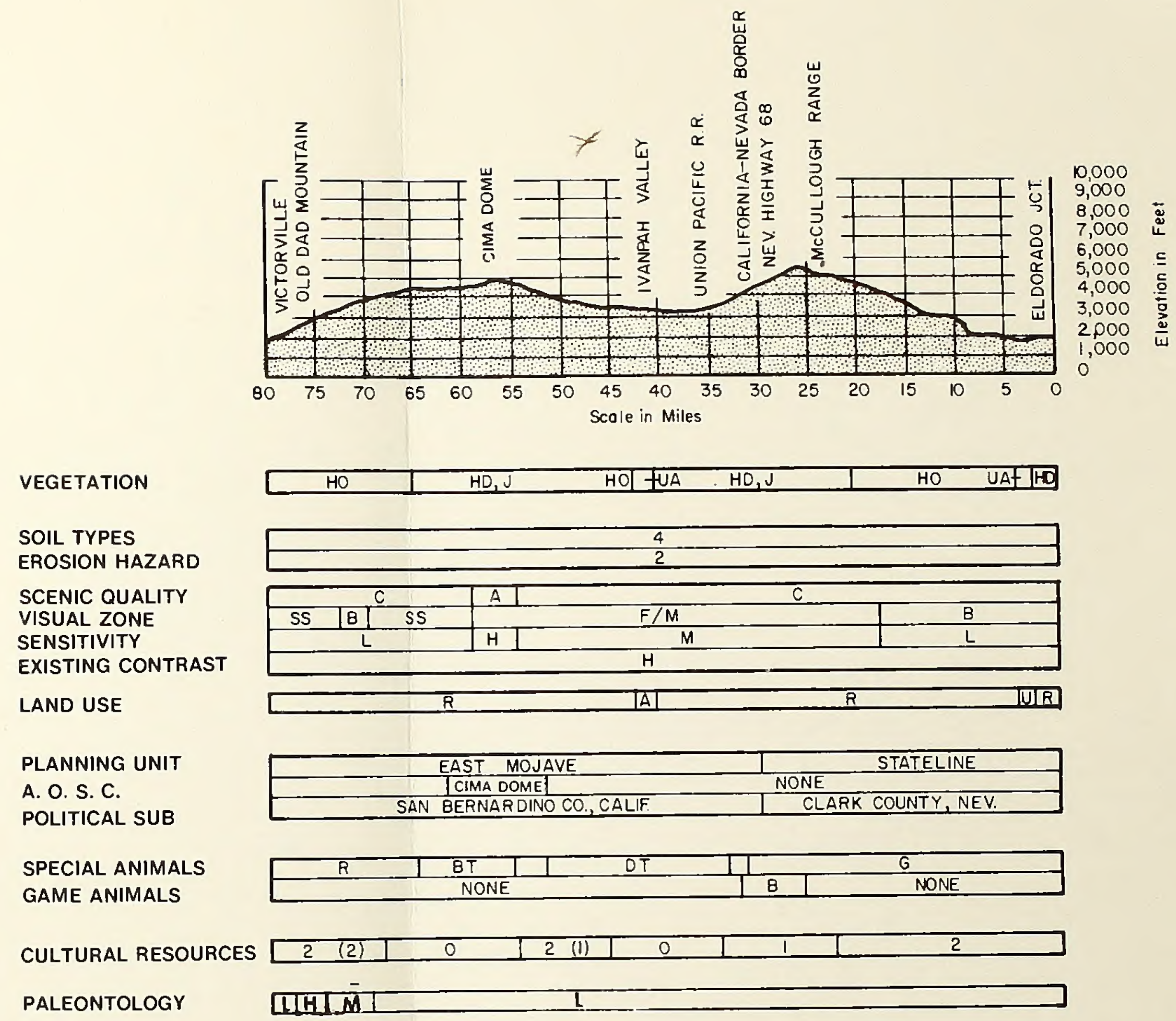
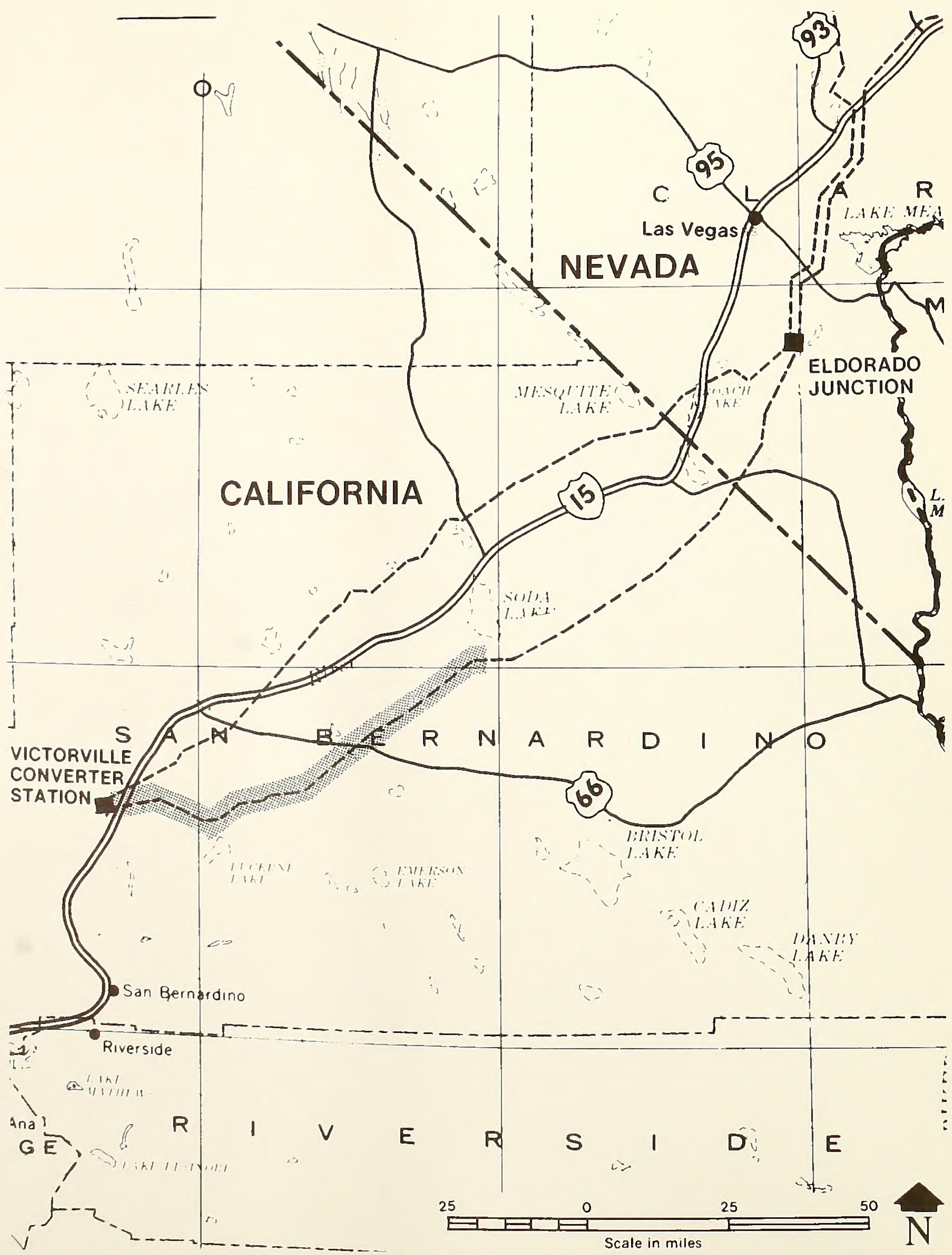


ENVIRONMENTAL PROFILE: SOUTHERN CALIFORNIA TRANSMISSION SYSTEM

ELDORADO JUNCTION TO VICTORVILLE
Line 2, Part 1

FIGURE 2-J



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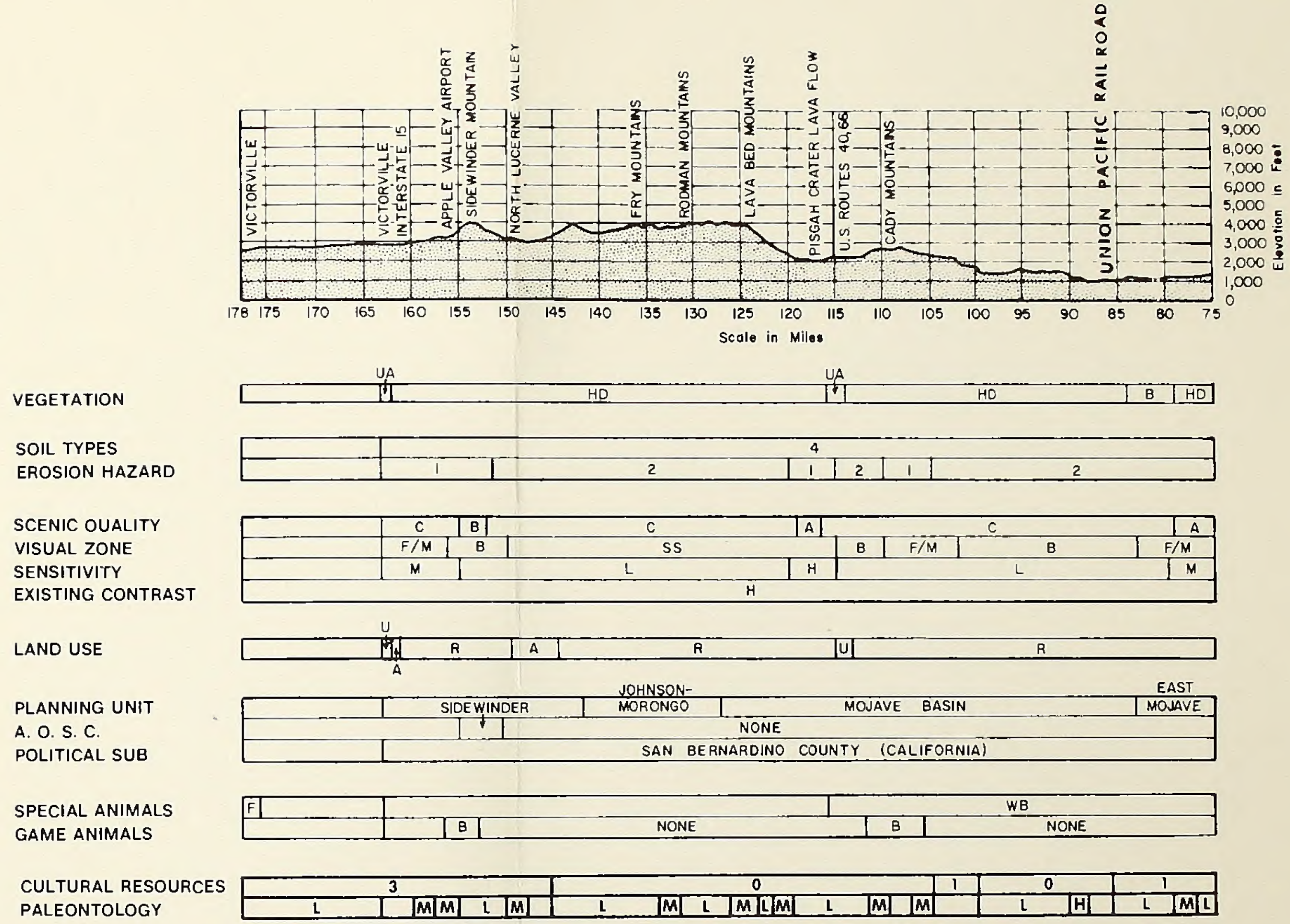
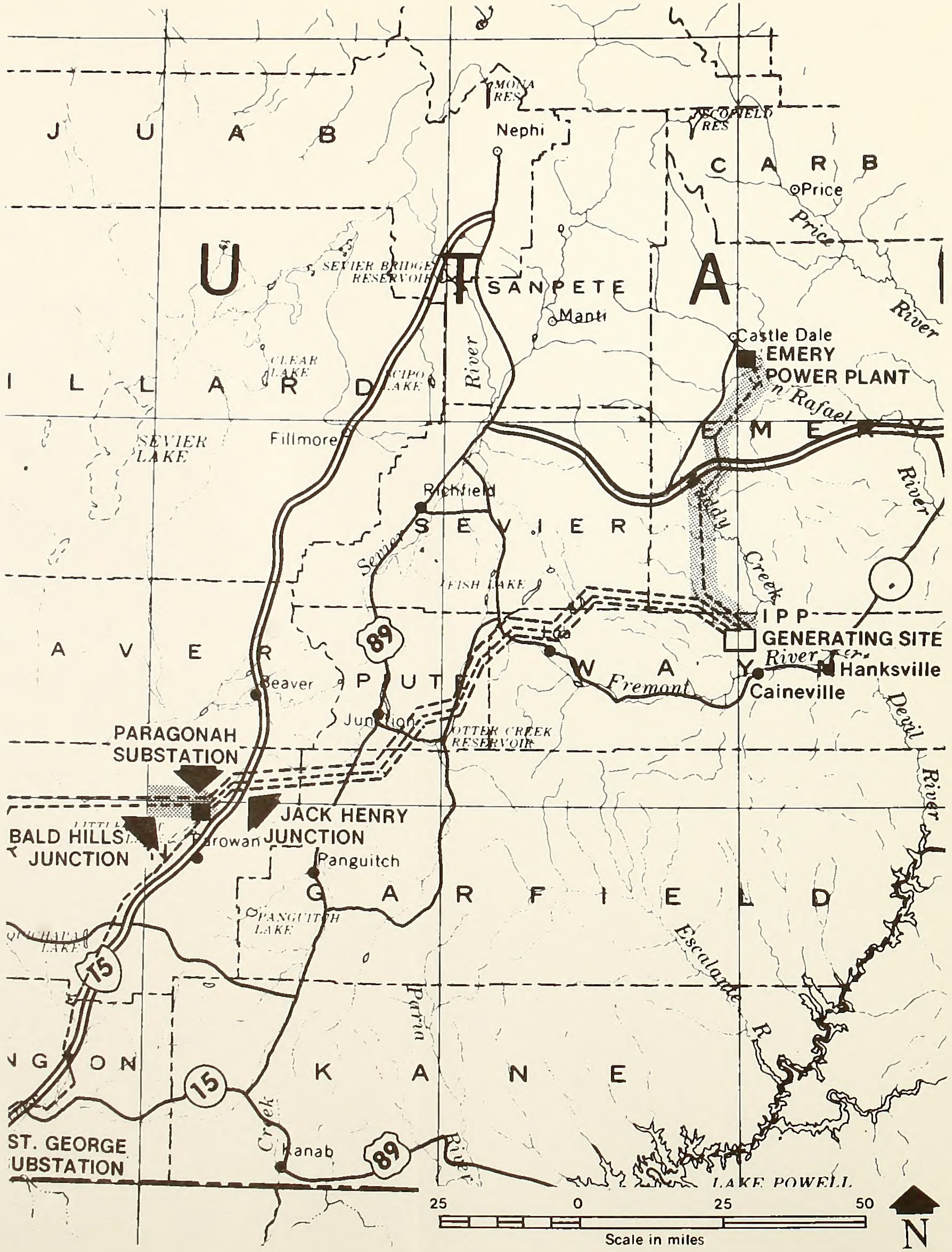


ENVIRONMENTAL PROFILE: SOUTHERN CALIFORNIA TRANSMISSION SYSTEM

ELDORADO JUNCTION TO VICTORVILLE
Line 2, Part 2

FIGURE 2-K



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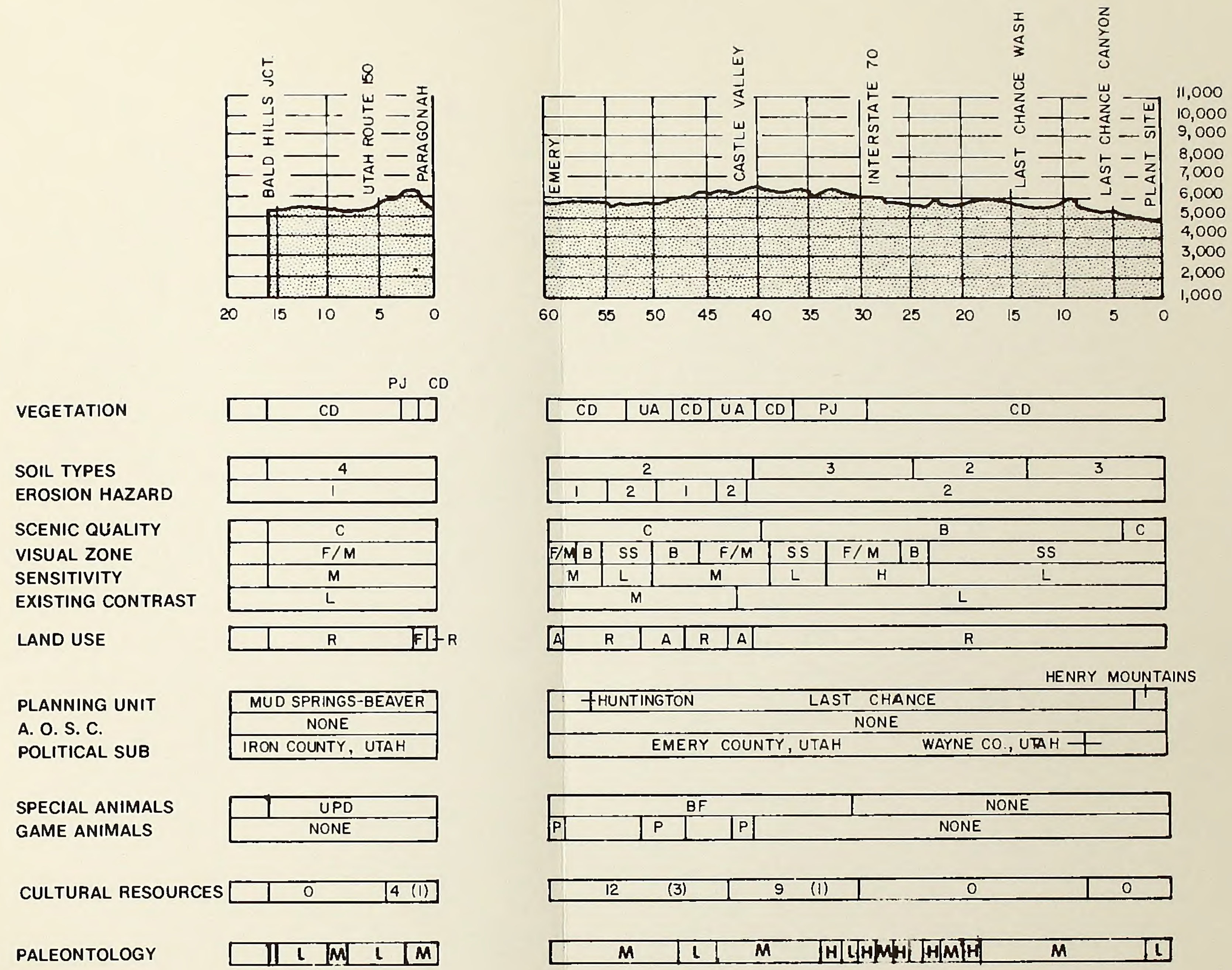
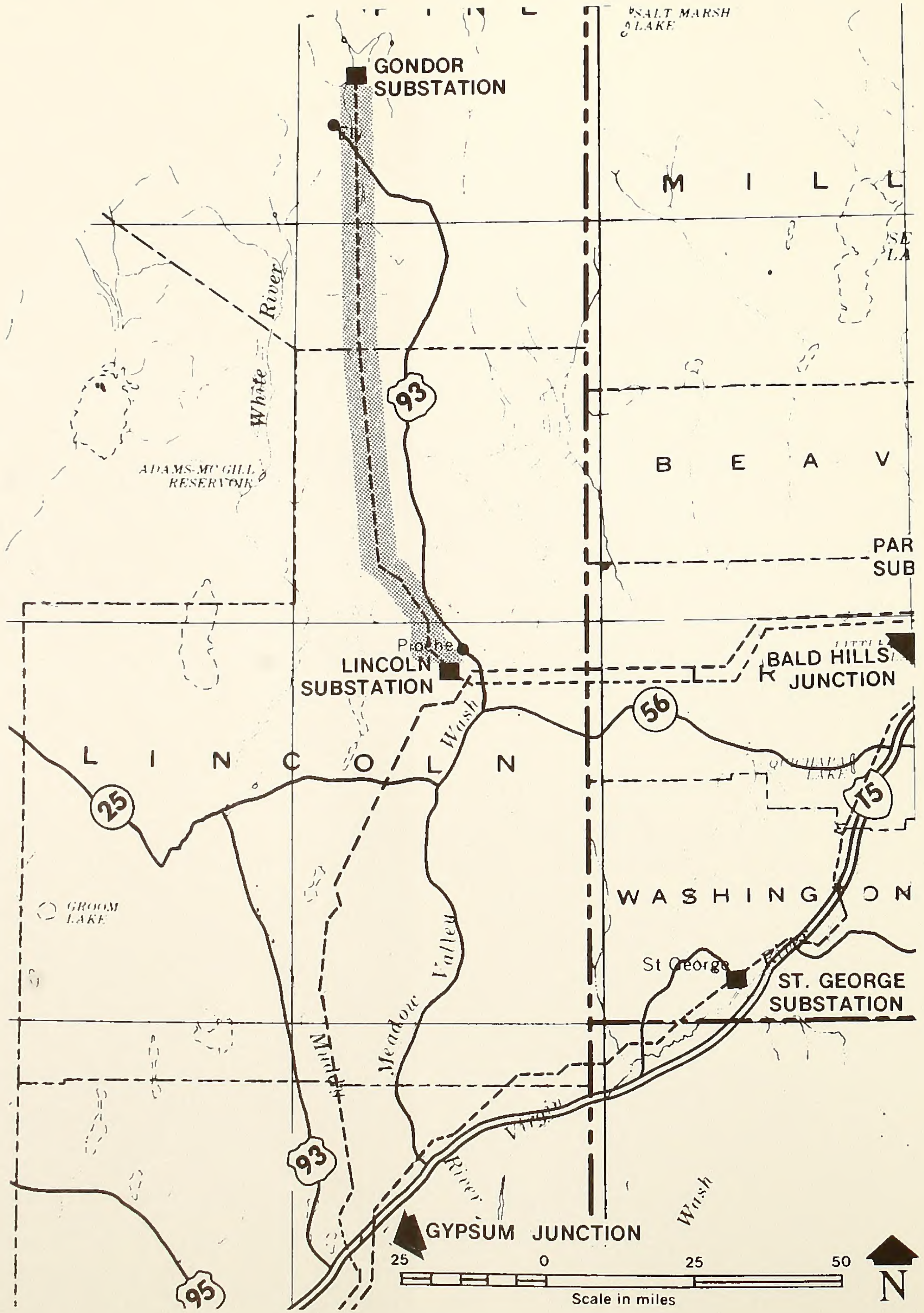


ENVIRONMENTAL PROFILE: UTAH TRANSMISSION SYSTEM

PARAGONAH TO BALD HILLS AND PLANT SITE TO EMERY

FIGURE 2-L



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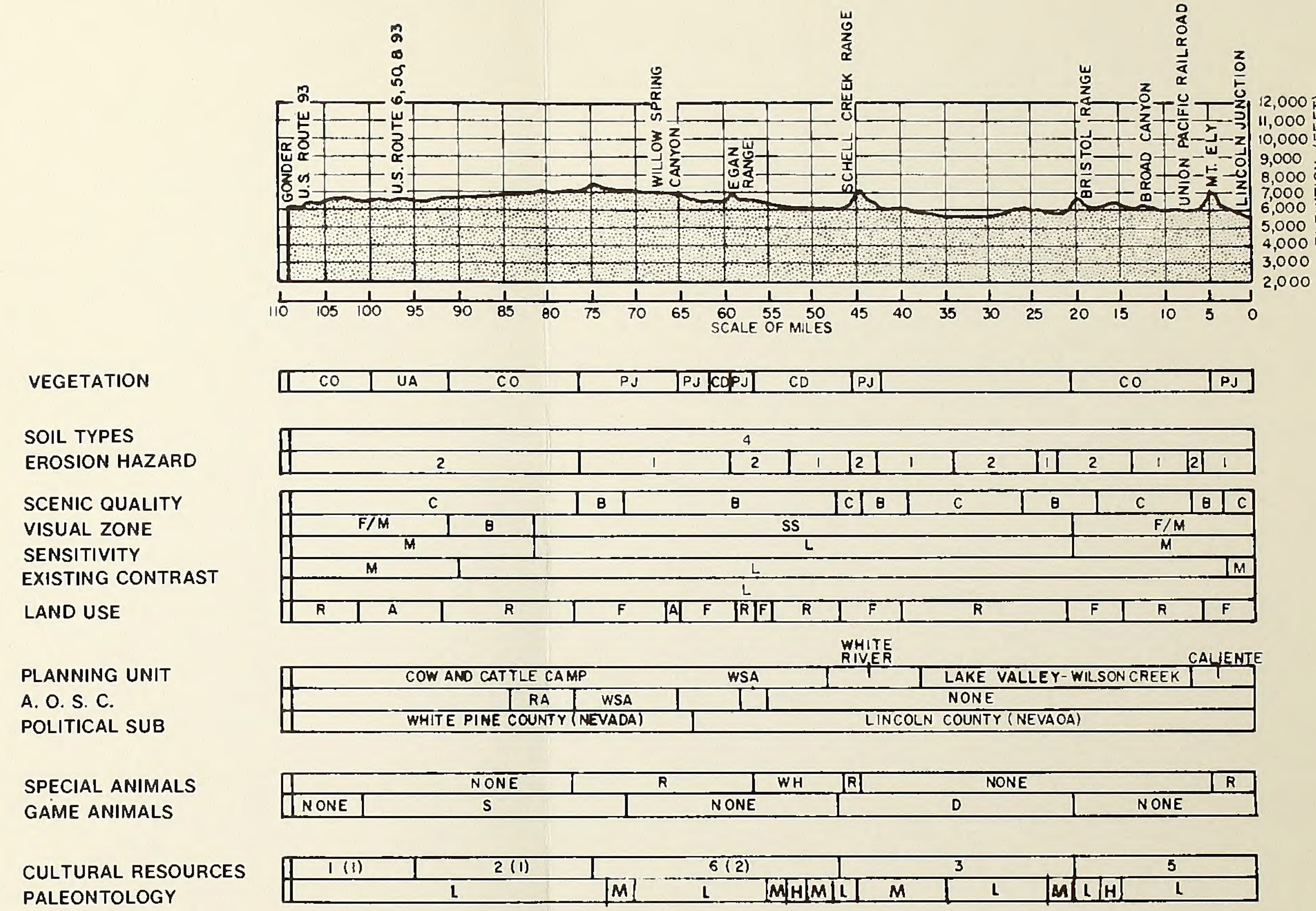


ENVIRONMENTAL PROFILE: UTAH TRANSMISSION SYSTEM

LINCOLN JUNCTION TO GONDER

FIGURE 2-M

CHAPTER 3

ENVIRONMENTAL IMPACTS

CHAPTER 3
ENVIRONMENTAL IMPACTS

A. INTRODUCTION

This chapter describes and evaluates the environmental impacts that could be expected from construction and operation of the proposed Intermountain Power Project at the Salt Wash site. The impacts discussed are those that would remain after application of company proposed and standard federal, state, and local measures described in Section G of Chapter 1. Only impacts which would significantly affect the quality of the human environment are discussed.

The significance of an impact depends upon its influence on the human environment, human activities, and human values. The analysis of each impact is traced from the proposed action to man and his environment. To accomplish this, each impact was followed from one environmental component to another. For example, the section on vegetation analyzes the proposal's direct impacts upon vegetation. The section on wildlife analyzes how removal of vegetation would impact wildlife. The recreation portion of the land use section then analyzes how the impact to wildlife would affect recreation.

An impact is discussed if it: 1) is considered controversial, 2) is of high public interest or concern, 3) substantially affects the human environment, or 4) if the subject of the impact is protected by law. When it is necessary to clarify the discussion of impact, its magnitude, incidence, and duration are indicated. National, regional, or local importance of impacts are also indicated.

The regional setting, primary project area (including the proposed railroad route), and linear project features (power transmission systems) are considered in the identification and assessment of environmental impacts.

B. CLIMATE AND AIR QUALITY

1. Climate

The effect of power plant plumes on climate is being investigated. Technical reports (Parungo, et al., 1978a; Parungo, et al., 1978b; and Pueschel, et al., 1978) tend to support the theories that fly ash released from a coal-fired power plant can act to form condensation and ice nuclei in clouds, thereby increasing the probability of precipitation near a plant. At present, however, there are insufficient data to determine the degree to which climate could possibly be altered by power plant plumes or to determine whether climate would be significantly impacted.

Weather modifications aided by cooling tower plumes are at present a very localized phenomena. Ground fog within a few hundred meters of mechanical draft cooling towers is common in cases with wind speeds exceeding 3.5 meters per second (Hanna, 1978). The effects of cooling tower plumes on cloud formation, visibility, and regional weather patterns are also being investigated. At present, no effects have been perceived on a regional or global scale.

2. Air Quality

a. General

The discharge of pollutants into the atmosphere would be an adverse impact. The estimated plant emissions of sulfur dioxide, particulates, and nitrogen oxides are listed on Table 1-11.

The primary method of evaluating air quality impacts of the proposed IPP plant in this chapter is through mathematical diffusion modeling. Air quality models are discussed in Appendix III-1.

Dispersion modeling calculations have predicted ground level SO_2 concentrations under varying meteorological conditions and determined, under worst case conditions, the highest expected SO_2 concentrations assuming 90 percent SO_2 removal. These predictions have been made independently by each of the following: Utah Bureau of Air Quality (1977), Westinghouse Electric Corporation (1977), Environmental Research and Technology (1977), and H. E. Cramer Company (1977). Calculations by the Utah Bureau of Air Quality were made using a screening model (EPA, 1977a). Westinghouse was IPP's meteorology consultant and Environmental Research and Technology and H. E. Cramer Company were consultants for the Bureau of Land Management. The H. E. Cramer Company used meteorology data for both 1975 and 1976 and the other studies used 1975 or hypothetical data. Stack and emission parameters used in these studies are shown in Appendix III-2. The calculations are for atmospheric stability conditions that would, in the opinion of the independent modeling groups, give the highest expected ground level concentrations. Differences in results can be attributed to variation in model accuracy, emission parameters, or what constitutes a "worst case" condition.

Maximum estimated annual and 24 hour ground level particulate concentrations, based on worst grade coal and with 99.75 percent removal, were determined by H. E. Cramer Co. (1977a).

Dispersion modeling calculations have also been performed to predict ground level NO_2 concentrations under varying meteorological conditions and to determine, under worst case conditions, the highest expected NO_2 concentrations. These predictions have been made by Westinghouse Electric Corporation, Environmental Research and Technology, and H.E. Cramer Company.

Isopleths for ground level concentrations of SO_2, particulates, and NO_2 as calculated by Cramer (1977) are shown on Appendix III-3.

b. <u>Air Quality Standards</u>

(1) <u>National New Source Performance Standards (NSPS)</u>

Table 3-1 presents the State and National New Source Performance Standards (NSPS) and the expected emissions from the proposed IPP plant. When burning worst-grade coal the plant emissions would be less than the allowable emissions standards for SO_2 and particulates. Emissions would equal the limit for nitrogen oxides.

(2) <u>State and National Ambient Air Quality Standard (NAAQS)</u>

Table 3-2 compares the NAAQ standards and the calculated maximum ground level concentrations of SO_2, particulates, NO_2, and ozone.

The 3-hr, 24-hr, and annual calculated ground level concentrations of SO_2 would be below the applicable NAAQS. According to Cramer (1977a), IPP's emission rate of particulates based on worst grade coal and 99.75 percent removal would also be within the applicable annual NAAQS, as would NO_2 and oxidant concentrations. Since NAAQS would be met, no impacts on human health and welfare, animals, or vegetation would be expected.

TABLE 3-1

State and Federal New Source Performance Standards (NSPS) and Expected IPP Emissions

Pollutant	Emission Standard (lb/million Btu)	IPP Plant Emissions[a] (lb/million Btu)	Percent of Standard
Sulfur dioxide	1.2	[b]0.12	10
Particulates	0.1	[b]0.017	17
Nitrogen dioxide	0.7	0.7	100

Source: Westinghouse, 1977.

[a]Based upon 90 percent SO_2 removal and 99.75 percent particulate removal.

[b]Particulate and SO_2 emissions based on 100 percent capacity and assumed worst-case coal characteristics of 0.7 percent sulfur, 9.0 percent ash, 11,400 Btu/lb for sulfur dioxide emissions and 11,300 Btu/lb for particulate emissions.

TABLE 3-2

Comparison of National Ambient Air Quality Standard (NAAQS) and Calculated Maximum Ground Level Concentrations of SO_2, Particulates, NO_2, and Oxidants

Emissions	National Ambient Air Quality Standards: Primary[a]	Secondary[b]	Calculated Maximum Ground Level Concentration: State[c]	ERT[d]	Cramer[e]	Westinghouse[f]	Natural Background Concentration[g]
SO_2							
Annual[h]	80 μg/m³	--	39.4	7	1.4	7	<13 μg/m³
24-hour[i]	365 μg/m³	--	117	58	83	75	>13 μg/m³
3-hour[i]	--	1,300 μg/m³	--	460	217	578	<13 μg/m³
Particulate Matter							
Annual[j]	75 μg/m³	60 μg/m³	7.02	1	0.2	--	19 μg/m³
24-hour[i]	260 μg/m³	150 μg/m³	--	47	10	40	90 μg/m³
NO_2							
Annual[h]	100 μg/m³	100 μg/m³	--	47	10	40	13 μg/m³[k]
Oxidants							
1-hour	.08 p/m	0.08 p/m	--[l]	--	--	--	59 p/m[m]

[a]For protection of human health.

[b]For protection of human welfare including damage to animals, vegetation, visibility, and property.

[c]Letter from Utah Bureau of Air Quality, April 14, 1977.

[d]Environmental Research and Technology, Assessment of Air Quality Impact of Emission from Intermountain Power Project, July, 1977.

[e]H. E. Cramer Co., "Assessment of the Air Quality Impact of Emissions from the Proposed Intermountain Power Project Power Plant at the Primary and Six Alternate Sites," March 1978 (Bowers, et al., 1978b).

[f]Westinghouse, Intermountain Power Project, Preliminary Engineering and Feasibility Study, Environmental Assessment, Vol. 5, Part 2, May, 1977.

[g]Data from Cramer (March, 1978) and Westinghouse.

[h]Annual arithmetic mean.

[i]Not to be exeeded more than once per year.

[j]Annual geometric mean.

[k]Maximum 1-hour value measured was 40 μg/m³.

[l]For a discussion of ozone, see item (4) in this section.

[m]Minimun 1-hour value measured was 132 μg/m³

(3) Prevention of Significant Deterioration (PSD) Increments

Applicable PSD increments (Class II surrounding the plant and Class I in Capitol Reef National Park) are shown in Table 3-3 and 3-4.

The Utah Bureau of Air Quality SO_2 modeling results show that Class II annual and 24-hour PSD increments surrounding the primary plant site would be exceeded (Table 3-3).

The Westinghouse, ERT, and Cramer modeling calculations show that Class II PSD increments would be met, with the exception of the 3-hr SO_2 concentration calculated by Westinghouse. Westinghouse calculated that all maximum concentrations would occur on the Moroni Slopes. Cramer's projected maximum annual, 24-hr, and 3-hr ground level SO_2 concentrations are plotted in Appendix III-3.

Each of the independent modeling groups calculated that the Class I 24 hour SO_2 PSD increment would be exceeded in Capitol Reef National Park, 9.6 miles west of the Salt Wash site. National parks are subject to Prevention of Significant Deterioration Class I under the 1977 Clean Air Act Ammendments.

The Westinghouse calculations, based on worst case coal characteristics, showed that in Capitol Reef National Park the 3-hr Class I SO_2 increment would be exceeded 12 days and the 24-hr increment would be exceeded on 7 days per year. These 7 days were days on which the 3-hr increment would also be exceeded.

The Cramer Study analyzed the possibility of exceeding Class I SO_2 increments at a number of Class I and potential Class I areas in southeastern Utah. These areas are presented in Table 3-5 along with model calculations of maximum 3-hr and 24-hr SO_2 concentrations at these Class I areas. The model calculations show that the IPP plant, located at the Salt Wash site, would exceed the 3-hr Class I SO_2 increment at Capitol Reef National Park, Canyonlands National Park, and Glen Canyon National Recreation Area, and the 24-hr Class I SO_2 increments at Capitol Reef National Park. These projected short-term violations at Capitol Reef National Park would occur 34 days per year.

The results of modeling calculations for particulates are also compared to the applicable PSD increments (Class II surrounding the plant and Class I in Capitol Reef National Park) in Tables 3-3 and 3-4. Appendix III-3 show the maximum calculated ground level annual and 24-hr particulate concentrations as determined by the H. E. Cramer Study (1977). The results of each of these modeling groups show that the maximum estimated particulate concentrations would not exceed the Class II increments around the IPP plant or the Class I increments in Capitol Reef National Park.

There are no PSD increments for NO_2.

(4) Ozone

There has been concern in recent years about ozone (O_3) production from power plants. Recent studies in the eastern United States (Davis, et al., 1974) have indicated that power plant plumes may become net producers of O_3 for distances of 25 miles, or greater, downwind. However, all plants in this category were located in humid environments (Ogren, et al., 1976). In addition, they were all located near urban areas where other pollutants could have influenced the power plant plumes.

Ozone concentrations in power plant plumes in the arid Southwest have been observed to be lower than the ambient concentrations outside the plumes (Williams, 1975; EPRI, 1976). Based on this information, it does not appear that IPP would be a net producer of ozone in the arid Southwest.

TABLE 3-3

Comparison of the Class II Prevention of Significant Deterioration Regulation (PSD) Increments and Calculated Maximum Ground Level SO_2 and Particulate Concentrations Applicable to the Area Surrounding the Proposed Plant Site

Emission	Class II Increment (Standard) μg/m^3	% Sulfur in Coal	Maximum Calculated Ground Level Concentrations μg/m^3 State[a]	ERT[b]	Cramer[c]	Westinghouse[d]	Natural Background Concentration μg/m^3
Sulfur Dioxide							
Annual	20	0.56	39.4	7	1.4	7	< 13
24-hour	91	0.7	117	58	83	76	< 13
3-hour	512	0.7	---	460	217	578	< 13
Particulates							
Annual	19	---	7.02	1	0.2	---	19
24-hour	37	---	20.57	7	11	12	90

[a] Letter From Utah Bureau of Air Quality, April 14, 1977.

[b] Environmental Research and Technology, Assessment of the Air Quality Impact of Emission from Intermountain Power Project, July, 1977.

[c] H.E. Cramer Co., "Assessment of the Air Quality Impact of Emissions From the Proposed Intermountain Power Project Power Plant at the Primary and Six Alternate Sites," March 1978 (Bowers et al., 1978b).

[d] Westinghouse, Intermountain Power Project, Preliminary Engineering and Feasibility Study, Environmental Assessment, Vol. 5, Part 2, May, 1977.

TABLE 3-4

Comparison of Prevention of Significant Deterioration (PSD) Class I Increments and Calculated Maximum Ground Level Concentrations of SO_2 and Particulates in Capitol Reef National Park

Emission	Class I Increment μg/m³	% Sulfur in Coal	Maximum Calculated Ground Level Concentrations μg/m³ State[a]	ERT[b]	Cramer[c]	Westinghouse[d]	Natural Background Concentration μg/m³
Sulfur Dioxide							
Annual	2	0.56	3.7	---	0.135	0.4	< 13
24-hour	5	0.7	27	25	24	8.7	< 13
3-hour	25	0.7	----	104	187	69	< 13
Particulates							
Annual	5	---	0.67	---	0.019	< 0.1	19
24-hour	10	---	8.4	---	3.0	1.7	90

[a] Letter From Utah Bureau of Air Quality, April 14, 1977.

[b] Environmental Research and Technology, Assessment of the Air Quality Impact of Emission from Intermountain Power Project, July, 1977.

[c] H.E. Cramer Co., "Assessment of the Air Quality Impact of Emissions From the Proposed Intermountain Power Project Power Plant at the Primary and Six Alternate Sites," March 1978 (Bowers et al., 1978b).

[d] Westinghouse, Intermountain Power Project, Preliminary Engineering and Feasibility Study, Environmental Assessment, Vol. 5, Part 2, May, 1977.

TABLE 3-5

Calculated Maximum 3-Hr and 24-Hr Ground Level SO_2 Concentrations at Existing or Potential Class I PSD Areas in Southeastern Utah

Potential Class I Area	Primary Plant Site 3-hr Concentrations (Allowable Increment 25 μg/m³)	24-hr Concentrations (Allowable Increment 5 μg/m³)	Minimum Distance From Each Area (mi)
Capitol Reef National Park[a]	187	24	9.6
Canyonlands National Park[a]	36	4	39.6
Arches National Park[a]	11	1	71.4
Willow Creek	5	1	81.6
Westwater Canyon	8	1	96.0
Dolores River	5	1	88.8
Glen Canyon National Recreation Area	41	5	43.8
Desolation Canyon	6	1	60.0
Lower Green River	16	2	48.0
Mexican Mountain	11	1	40.8
San Rafael Reef	15	2	24.0
Sids Mountain	7	2	30.0

Source: Bowers, et. al., 1978b.

[a]Existing Class I areas.

(5) Trace Elements

Potential health effects of trace elements, principally heavy or trace metals, are causing increased public concern (Radian, 1975). Elements present in concentrations of 0.1 percent (1,000 parts per million) or less are usually referred to as trace elements. The main source of trace elements in coal is the mineral matter associated with fossil plant tissues.

The EPA has designated mercury and beryllium, normally found in trace quantities, as hazardous air pollulants (40 CFR 61). Certain other trace elements found in coal are reported to have potential effects on human health. These elements are selenium, lead, cadmium, and zinc (Radian, 1975).

Electrostatic precipitators can be made quite efficient for the removal of most trace elements, but would be less efficient for removal of those elements which concentrate on very fine particles and are essentially ineffective on such volatiles as mercury (Klein et al., 1974). SO_2 scrubbers are estimated to remove at least 50 percent of the fine particulates which pass through the electrostatic precipitators. However, in pilot plant testing, scrubbers similar to those proposed for IPP demonstrated an ability to remove 70 to 98 percent of the fine particulates (Weir et al., 1974).

Appendix III-4 discusses the emission rates of trace elements and the maximum concentrations which could be added to the soil over the project's life due to fly ash deposition. Long-term accumulation of trace elements has a potential impact on the environment if accumulated in sufficient quantities, but distribution pathways through the ecosystem are not well defined. IPP would make a relatively small contribution to existing levels during the project's life.

(6) Radioactive Elements

Power plant emissions would contain small amounts of uranium and thorium and their decay products (including radium) (Eisenbud and Petrow, 1974).

Appendix III-4 includes estimated maximum deposition rates for radioactive elements such as thorium and uranium. Based upon expected quantities of radioactive elements within coal, calculated emission rates, and predicted dilution rates into the atmosphere, the concentrations rates would be well within the maximum permissible levels as defined by the Atomic Energy Commission, now known as the Nuclear Regulatory Commission, regulations in 10 CFR 20. Radioactivity produced during the expected lifetime of the project would be a small fraction of the levels of natural radioactivity occurring in soils of the area. Therefore, cumulative impacts should be small.

(7) Secondary Pollutants

Emissions from coal fired power plants are carried by atmospheric transport, during which time new pollutants may be formed (Wilson, 1976). Sulfur dioxide may be converted into sulfate aerosols (particulates) and nitrogen oxides may undergo reactions to form nitrate aerosols (particulates). Sulfate and nitrate aerosols are formed by the atmospheric conversion of SO_2 and NO_2 and are transported over long distances.

Tall stacks, which reduce ground level pollutant concentrations, are proposed by IPP to conform with ambient air quality standards. However, pollutant emission from tall stacks increases the residence time (length of time pollutants would remain in the atmosphere), which may result in increased sulfate and nitrate aerosols. These aerosols may travel hundreds of miles and

cause air quality degradation. Both nitrate and sulfate particulates tend to be fine particles between 0.2 and 2 microns in size. In the arid Southwest aerosols in this size range may be suspended in the air for days before they are removed by natural processes, such as dry deposition in soil or on vegetation.

In a study sponsored by EPA entitled Midwest Interstate Sulfur Transformation and Transport Project (MISTT), a power plant plume near St. Louis, Missouri, was tracked to distances greater than 120 miles on at least three different occasions (Smith, et al., 1976). It was estimated that, in this humid environment, the average SO_2 to SO_4 oxidation rate was 3 percent per hour (EPA, 1976a).

A 3 year study of the Four Corners power plant in New Mexico, an arid environment, was initiated in 1974 to determine SO_2 removal rates, measure the degree of SO_2 to SO_4 conversion, and determine the impact of SO_4 concentrations on visibility (Hill, et al., 1975). The results showed SO_2 removal rates (decrease in SO_2 concentration) of 2 to 10 percent per hour in a plume. The maximum increase in SO_4 between upwind and 37 miles downwind was 1.5 percent by weight. The average oxidation rate of SO_2 to SO_4 was 0.57 percent per hour. Since Four Corners emits approximately twice the amount of SO_2 expected from IPP, a greater impact from the proposed IPP plant would not be expected.

The formation of particulate nitrates would occur from the conversion of NO and NO_2 in power plant plumes (Wayne, 1973).

Measurements taken from aircraft during the Lake Powell Research Project indicated rapid NO to NO_2 oxidation in the plume of the Navajo power plant (Williams and Cudney, 1976). Both gaseous and particulate nitrates were found on occasion. Conversely, an EPA panel on atmospheric transport of pollutants stated that measurement techniques are not sufficiently sensitive to take measurements for nitrate concentrations from aircraft in the time scale permitted by an emission plume (EPA, 1976b). Wayne (1973) is of the opinion that the production of particulate nitrates in a power plant plume is unlikely according to the recognized chemistry of atmospheric photo-oxidation systems (Haagen-Smit, et al., 1968). Additional research is needed to determine the degree of particulate nitrate formation in power plant plumes and its effect upon the environment.

The major impact of sulfates and nitrates as a secondary pollutant from IPP would be in the form of visibility degradation. A discussion of visibility can be found in item (10) of this section.

(8) Plume Opacity

Plume opacity is the degree to which emissions reduce the transmission of light and obscure the view of an object in the background (40 CFR 60.2). The state and federal New Source Performance Standards (40 CFR 60) limit visible emissions during normal operation to below 20 percent opacity as measured by a Ringleman Chart, (EPA, 1975). Therefore, the visibility through a plume is not to be obscured or reduced more than 20 percent by gaseous or particulate pollutants. Opacity readings of portions of plumes which contain condensed, uncombined water vapor shall not be used to determine compliance with opacity standards.

Stack gases from each stack of the proposed IPP plant would have an estimated particulate loading of 0.014 grams per cubic meter (Westinghouse, 1977). According to calculations by Ensor and Pilat (1970), stack gasses with a particulate loading or mass concentration less than 0.016 grams per cubic meter would be below the 20 percent opacity standard. The IPP plant would, therefore, be expected to meet this requirement.

The plume emitted from the stacks would contain water vapor due to the operation of the SO_2 scrubbers. As the plume leaves the stack, it would cool and water vapor would condense and become visible. As the plume begins to mix with the surrounding air, the condensed water or steam would evaporate.

The condensed water plume may be visible as it rises above the stack (Westinghouse, 1977). When the plume begins to bend horizontally, enough mixing with the surrounding air should take place so the plume would no longer be visible. During summer days the condensed water could be visible 50 to 100 feet above the two proposed 750 foot stacks. During cold winter mornings under relatively calm winds, the condensed water may be visible 300 to 600 feet above the stacks.

(9) Cooling Tower Plume

Visible cooling tower plumes are estimated from the meteorology data collected at the site and operating characteristics of the cooling towers required for the plant. Cooling tower modeling equations, as described by Hanna (1972), were used to determine cooling tower plume length. The results show that, approximately 2.7 percent of a year, the cooling tower plume would be visible beyond 0.6 mile from the towers (Westinghouse, 1977). During 0.3 percent of the year, there would be the potential of visible plumes greater than 2.5 to 3.5 miles in length. The potential of plumes 6 to 10 miles long would occur one day total per year. These calculations suggest that much of the time cooling tower plumes would be short or invisible with little effect on the environment.

Through plume drift, maximum total dissolved solids deposition rates of 1.64 lb/acre/month would occur approximately 0.25 mile downwind of the plant. Deposition rates at 0.6 mile would be approximately 0.34 lb/acre/month and at 3 miles, less than 0.01 lb/acre/month. Based on this analysis, most of the total dissolved solids in the drift would be deposited within the plant site boundaries. Approximately 90 percent would be deposited within a 1.9 to 2.5 miles radius of the plant. This represents a total area of 6,986 to 12,421 acres.

Calculations of drift depositions from typical 1,000 MW mechanical-draft cooling towers utilizing salt water have demonstrated that there is no significant impact on soils (Roffman, A., and Roffman, H., 1973). Therefore, the drift from the IPP cooling towers is not expected to have any impact on local vegetation (mainly salt tolerant desert types) beyond the plant boundaries.

(10) Visibility

The Environmental Protection Agency (EPA) is required by the Clean Air Act Amendments of 1977 to recommend by April 1979 the appropriate methods for estimating, preventing, and remedying any future or existing impairment of visibility over Class I lands resulting from man-made air pollution.

Considering the beginning state of the art, availability of data, and lack of sophistication of technique, many uncertainties exist in assessing potential visibility impacts. The 1977 Clean Air Amendments do not provide any guidance on how to assess visibility impacts and regulations have not yet been promulgated that could be used to assess impact significance. Therefore, any consideration of visibility impacts must be made without the benefit of specific guidance from EPA.

During a conference on visibility modeling hosted by the BLM Utah State Office on 15 March, 1978, a working group comprised of representatives of

government agencies and private industry suggested that the variability shown by existing visibility measurements be considered in assessing the significance of visibility reductions caused by power plant emissions. The working group also suggested that a significant visibility reduction might be defined as a reduction that equals or exceeds one standard deviation of the mean visibility.

Haze, a major cause of visibility reduction in the area of the proposed power plant, refers to a blurring or reduction in the perception of distant objects (EPA, 1975a). The visual effect of haze is similar to that of fog, although a color effect is more frequently observed with haze. Aerosols and particulates associated with haze may also contain water but are comprised primarily of solids and other liquid materials which have been emitted into the atmosphere or produced in the atmosphere as a result of photoinduced reactions of gaseous pollutants.

The visibility reduction which would be caused by the IPP plant is estimated by modeling calculations and comparisons of effects caused by existing power plants in the Southwest.

Visibility modeling estimates were made by Westinghouse on the effect of IPP emissions in Capitol Reef National Park, 9.75 miles west of the proposed plant site, and Canyonlands National Park, 40 miles east of the proposed plant site (1977). The estimates were made for two cases--the effects on an observers' sight path within the parks and looking at an object outside the parks. Ambient concentrations of SO_2, particulates, sulfates, and nitrates were considered in the calculations. The calculations assumed a 1 percent per hour conversion rate of SO_2 into sulfates (EPA, 1974b). The rate of conversion of NO_2 into nitrates, assumed in the calculations, was 1 percent per 24 hours. The existing background clean air visual range was assumed to be 87 miles (ideal conditions--no haze, rain, snowfall, dust, or low level clouds). Using 24-hr concentrations based upon average coal characteristics the calculations show:

> In Capitol Reef National Park, the visual range would be reduced from 87 miles to between 80 and 84 miles for 7 to 11 days each year. For the remainder of the time the reduction in visibility would be less than 3 miles out of 87 miles.
>
> The visual range of an observer standing in Capitol Reef National Park and looking eastwardly toward the IPP plant, would be reduced from 87 miles to between 75 and 83 miles. This reduction would occur about 6 months out of a year depending on the observers' location relative to the plume.
>
> The visual range within Canyonlands National Park would be reduced to about 83 miles about 7 to 11 days each year. For the remaining time the reduction in visibility would be less than 4 miles out of 87 miles.
>
> The visual range of an observer standing in Canyonlands National Park and looking westwardly toward the IPP plant at an object outside the park boundaries would be 75 to 83 miles during about 6 months a year, depending upon observer location relative to the plume.

> The visual range, based on data from 1975 through 1976, is about 40 miles or less for about 20 percent of the time. Under these conditions, the plant would reduce the visibility from within the park boundaries to an object outside the boundary to between 34 to 39 miles.

A description of how Westinghouse performed these modeling calculations is discussed in Appendix III-5.

The use of the maximum 24-hr average concentration rather than the maximum 3-hr average concentration may not represent the possible worst case condition and may not be adequate to estimate possible worst case visibility reduction.

Williams (1977) calculated the difference between blue light and red light visual ranges looking from Capitol Reef National Park toward the IPP plant site. Nitrogen dioxide has very little effect upon red light and a strong effect upon blue light. If the wind were from the northeast at 4 mph, an observer in Capitol Reef looking toward the plant and across the plume could experience a red light visual range of 77 miles while simultaneously the blue light range could be reduced to 15 miles. Therefore, color perception of distant objects under these conditions could be altered. However, the frequency of occurrence of meteorological conditions leading to this visibility condition is low. For example, during the 1975 monitoring period, winds from the northeast were observed less than 4 percent of the time and the average of the observed wind velocities was 14 mph (Appendix II-2, Figure 4). These higher average winds would lead to a greater dilution of the plume by the surrounding atmosphere resulting in a lower visibility impact.

A 3 year study at the Navajo power plant (Dames and Moore, 1975) indicates an average visual reduction of about 8 miles, or from 90 to 82 miles. This visibility reduction was determined by taking photographic measurements of distant terrain features six times daily from 1972 through 1974. A separate study based on daily subjective visibility measurements of distant terrain features, conducted 3 years before and 3 years after plant start-up, (Salt River Project, 1977) indicates that no reduction in the prevailing visibility has occurred since the beginning of Navajo plant operation.

It is difficult to predict the visibility impact of the IPP plant because there is no other power plant in the Southwest comparable to the size of the proposed plant. Visibility degradation from power plants can be attribuited to both particulate and NO_2 emissions. IPP would emit far less particulates and considerably more NO_2 than existing major power plants in the Southwest.

According to Williams and Cudney (1976), an atmospheric discoloration has been observed at Page, Arizona as a result of NO_2 emissions from the Navajo power plant. Since IPP would emit 43 percent more NO_2 than Navajo, a discoloration of the atmosphere could be expected.

The determination of the significance of the impacts to visibility in Class I areas would depend upon the regulations that are to be promulgated by EPA sometime after August 7, 1979 and the position of the federal land manager charged with the direct responsibility for management of the affected Class I area as to the impact on air quality related values (including visibility). It is the present policy of the National Park Service to protect the scenic values of their Class I area from any visual impairment at human levels of perception which is adverse (memo from Director, NPS, to Mr. Divid Hawkins, EPA, April 5, 1978).

c. Construction Activities and Increased Population

Construction activities would result in a temporary increase in particulates around the proposed IPP plant site. Fugutive dust or nonpoint source particulates would be generated from dirt roads, earth moving, aggregate storage piles, and other surface disturbances (EPA, 1974a). Particulates from these sources are not under state and federal standards and it is difficult to quantify the impact of these short-term emissions.

A long-term increase in SO_2, particulates, and NO_2 from population increase in the plant area could be expected. The resulting concentrations generated by transportation, solid waste disposal, and commercial fuel consumption are expected to be only slightly higher than the current background levels. The particulate and NO_2 concentrations due to these low-level urban emissions have been estimated, for other power projects, to exceed the concentrations resulting from power plant emission (EPA, 1977c).

C. TOPOGRAPHY, GEOLOGY, MINERAL RESOURCES, AND PALEONTOLOGY

1. Regional Setting

Increased collecting and removal of known fossils in the region would likely result from increased numbers of people associated with the proposed project. Such activity is impossible to quantify but scientifically important fossils including dinosaur remains would be removed from location without proper documentation of information. Scientific and educational values would be lost. The Morrison Formation, which is one of the most important fossil bearing formations in the western United States, would probably be the most heavily impacted.

2. Primary Project Area

Surface geology and topography within the primary project area would be modified by taking approximately 7.6 million cubic yards of borrow material on 200 acres from identified borrow sites (see Figure 1-6).

The proposed town construction may make future recovery of coal or other minerals difficult. It is not expected that the coal beneath the proposed new town site could be economically recovered even without the proposed project (Doelling, 1972). The amount and quality of other minerals is undetermined.

Construction activities within the primary project area would disturb the position and relationships of fossils and result in the loss of scientific and educational values. The greatest impact would be in those formations with potential for high paleontological significance (Figure 2-6 and Table 2-7). However, with the measures required of the applicant by Federal Agencies for protection of paleontological resources, construction activities could provide new paleontological information. New access along the proposed well field would allow rockhounding in remote areas and result in an unquantifiable loss of paleontological resources which have scientific and educational values.

3. Power Transmission Systems

Construction activities along the proposed transmission systems would disturb the position and relationship of fossils and result in an unquantifiable loss of paleontological data. This loss would be greatest along the 41 miles of geologic formations with potential for high paleontological signific-

ance that would be crossed by the proposed power transmission lines as shown in Figures 2-B through 2-M and Appendix II-3. However, with federal requirements for protection of paleontological resources, construction activities could provide new paleontological information. Due to limited technology in collecting methods, some information would be destroyed.

New permanent access roads along the transmission lines would result in an unquantifiable increase in rockhounding and a commensurate loss of scientific and educational values.

D. SOILS

1. Regional Setting

As a result of increased population in the region, an unquantifiable increase in ORV activity would occur northeast of Hanksville on soils susceptible to wind erosion. The ORV activity would disturb these soils and make them more subject to wind erosion for approximately 20 years after being disturbed. However, because of the prevailing westerly winds and the 20 mile distance to Capitol Reef National Park, it is not expected this activity would reduce visibility within the park.

The mountain and foothill soils receive between 14 and 24 inches of rainfall annually. It is estimated that these soils, if disturbed by ORV activity, would be revegetated in about 10 years. The shallow rocky and shale soils receive less than 10 inches of rain annually and could likely be revegetated in 20 years.

2. Primary Project Area and Coal Haul Railroad

Construction activities within the primary project area would remove vegetation, compact soils and cause localized increased erosion on approximately 5,710 areas. Since the impacts would be localized and the area has high natural sediment production, no secondary impacts to water quality or other resources are likely to occur. Revegetation would bring sediment production back to present levels within 10 to 20 years. The same impact would occur along the 45 miles of high erosion hazard soils which would be crossed by the coal haul railroad.

3. Power Transmission Systems

Erosion would increase as soil stabilizing vegetation would be removed or crushed and soils would be compacted by construction equipment. The potential for increased erosion would be greatest along approximately 500 miles of moderate to high or severe erosion hazard areas that would be affected by the transmission line systems (Figures 2-B to 2-M). Increased erosion would be localized on the disturbed areas and no impacts on other resources would be expected. Field examination of existing transmission lines in high erosion hazard areas have failed to reveal any severe soil erosion (BLM, 1978.) Figure 3-8 is a photograph of one such transmission line. The disturbed areas in the cold desert and mountain areas of Utah and Nevada would likely revegetate and stabilize within 10 to 20 years and the hot desert of Utah, Nevada, and California would likely stabilize within 30 years (Vasek et al., 1975.)

One area of major concern would be between mileposts 22 and 26 of the Salt Wash to Jack Henry Junction segment of the Southern California and Utah transmission systems (see Figure 2-B). Along this segment new access roads

would be required. Soils in the area are unstable and slumping would occur along the access roads and tower pads.

E. WATER RESOURCES

1. Regional Setting and Primary Project Area

a. Surface Water

The project would use 30,000 acre-feet of water annually from the Fremont River--which represents about 2 percent of Utah's share of Colorado River water (Olds, 1979). Other uses of the water within the State of Utah would be precluded.

It is assumed that only a small part of the proposed 20,000 acre-feet annual ground water withdrawal drains into the Colorado River; the impacts of ground water removal are discussed under the ground water section.

Water in the Fremont River is of relatively high quality during winter and would be diverted for project use. Water flowing during the summer is of poorer quality and would not be diverted by IPP. Water quality would be reduced in the Colorado River. It is estimated that the proposed water withdrawal would increase the salinity of the Colorado River at Lee's Ferry by, at most, 0.6 milligrams per liter. This would be an increase of less than 1/10 of one percent (USGS, 1976).

Withdrawing 30,000 acre-feet of water annually would remove approximately 57 percent of the river's mean annual flow as measured at Caineville. The normal streamflow would be completely diverted from the river during the period November through March, except for those periods when the flow exceeded 150 cubic feet per second (ft^3/s). The river flow below the diversion dam would be essentially zero during the winter months except for minimal flow arising from water seeping through the dam. This could be augmented by some increases in return flow from irrigated lands and from tributary inflow.

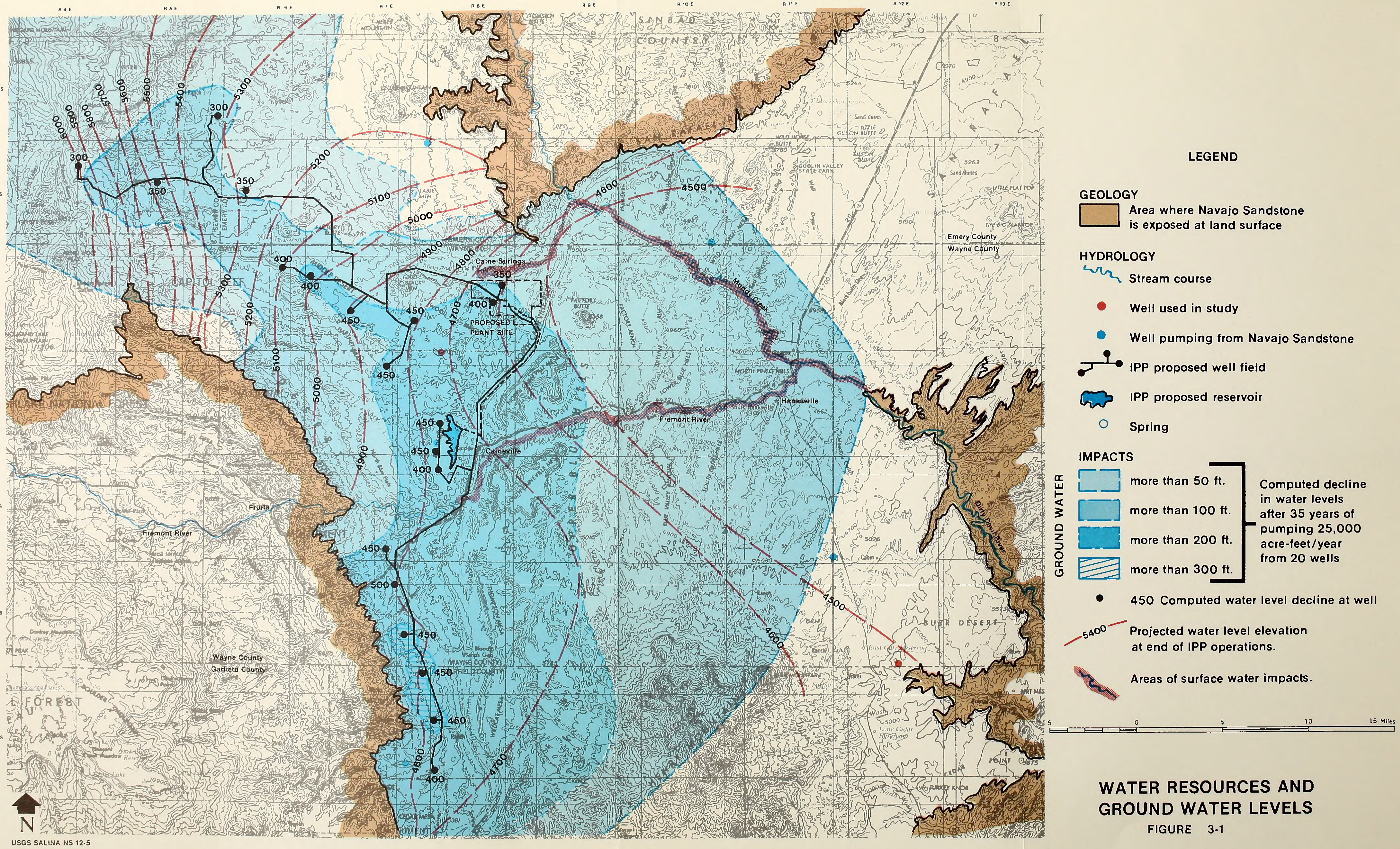
The new town would increase the mean annual runoff from the area (1,080 acres) for the life of the town (greater than 35 years). While this increase could be considered beneficial, the poor water quality of urban runoff could also be considered a negative impact. The impacts of the increased runoff would be dissipated a short distance from the town site.

A temporary increase in sediment supply caused by construction of the diversion dam, Red Desert reservoir, and other project components would occur until the disturbed areas have been revegetated (approximately 10 to 20 years).

b. Ground Water

Ground water would be "mined" from the aquifer because withdrawal would far exceed recharge. Figure 3-1 depicts the predicted drawdown of the water levels and the new elevation of the ground water after pumping 25,000 acre-feet annually for the project life. As shown in Figure 3-1, the water level of four existing wells could be lowered by the proposed ground water withdrawal.

The decline of ground water levels would affect as many as 24 springs and seeps discharging from Navajo Sandstone. Drawdown data shows that the new ground water surface at the end of the IPP operation would generally be below the land surface. Therefore, up to 24 springs which discharge from the Navajo Sandstone under artesian pressure could be expected to cease their natural flow. Caine Spring, the water quality of which indicates at least part of its flow is derived from the Navajo Sandstone aquifer, would probably cease natural



WATER RESOURCES AND
GROUND WATER LEVELS
FIGURE 3-1

flow. This spring, if totally originating from the Navajo Sandstone, is expected to cease its natural flow about two years after pumping begins (USGS, 1976). IPP is committed to replace the flow at Caine Spring (see Chapter 1).

A general degradation would occur in ground water quality because ground water quality becomes poorer with depth (Hood, J., 1976). Lowering of the water level would leave water higher in mineral content.

Water levels and water quality would begin to recover as a result of natural recharge when pumping terminates. It could be expected that in excess of 50 years would be required before ground water in the area would return to present equilibrium conditions.

Blasting near srings during construction of project components could fracture aquifers and reduce or change the location of spring flows.

2. Power Transmission Systems

During construction, some increase in runoff and sediment yield could be expected in streams crossed by the proposed power transmission systems due to the establishment of impermeable surfaces (e.g. access roads) which concentrate rainfall. The loosening of relatively stable soils and rocks during excavation would also tend to increase the sediment yield of the affected streams. None of these effects would be expected to extend further than a few hundred feet from the points of origin. In addition, the effects would be limited to the construction period and reduced as the disturbed areas were revegetated.

Blasting near springs during construction of towers could fracture aquifers and reduce or change the location of spring flows.

F. VEGETATION

1. Regional Setting

The large increase in the areas population would mean an increase in recreational use of resources. Essential habitat for proposed and candidate threatened and endangered plant species in the region (Appendix II-11) could be damaged by increased recreational use (e.g., ORV). Any disturbance of unique areas could alter or destroy unique habitat for plants. Some individual plants of the proposed and candidate threatened and endangered species in the region could be destroyed. However, it is not likely that the continued existence of these species would be jeopardized.

2. Primary Project Area and Coal Haul Railroad Route

Three types of vegetation--cold desert, agricultural, and riparian--would be affected by project components in the primary project area and along coal haul railroad route. Nearly 15,012 acres of the land requested for these portions of the project are covered with sparse, cold desert vegetation. About 5,710 acres are expected to be disturbed and about 5,220 acres would remain occupied.

Approximately 40 acres of riparian vegetation would be inundated by the diversion works. Diversion of the Fremont River would inhibit growth of phreatophytes downstream from the diversion point of the diversion. The impact on this riparian vegetation (approximately 200 acres) cannot be accurately quantified, but is expected to be slight, because the water would be diverted during the winter when plants are dormant. Pumping of water from the Navajo Formation could stop natural flow at as many as 24 springs and seeps, which would result in the loss of riparian vegetation.

A cactus, Sclerocactus wrightiae, which is on the 1976 proposed list of endangered flora, could be impacted by construction of the generating station. A portion of the population on the site could be destroyed. The Red Desert reservoir and diversion works sites do not support any candidate or proposed threatened or endangered plant species (Williamson and Atwood, 1977).

The unusual endemic composite (sunflower family), Parthenium alpinum, in the vicinity of the railroad route could be reduced in number.

3. Power Transmission Systems

The Southern California Transmission System would cross approximately 79 miles of Joshua tree forests in the hot desert vegetation type as shown on Figure 2-B through 2-M. Approximately 320 acres of Joshua tree forest would be disturbed of which 14 would remain occupied.

Figure 3-2 compares acreage of vegetation types which the transmission system would cross and disturb.

Construction of the line could impact any candidate or proposed threatened or endangered plant which occurs along the routes (Appendix II-12). Any construction activity which requires modification of the soil's surface would have some effect upon vegetation. The extent of the effects are for the most part unknown, but are expected to be termporary. Individual plants of threatened or endangered species could be inadvertantly destroyed. Although there are many California plants on candidate and proposed lists of threatened and endangered flora, none are known to occur directly in the proposed routes and probably none of these would be impacted (Johnson, 1977).

G. ANIMAL LIFE

1. Regional Setting

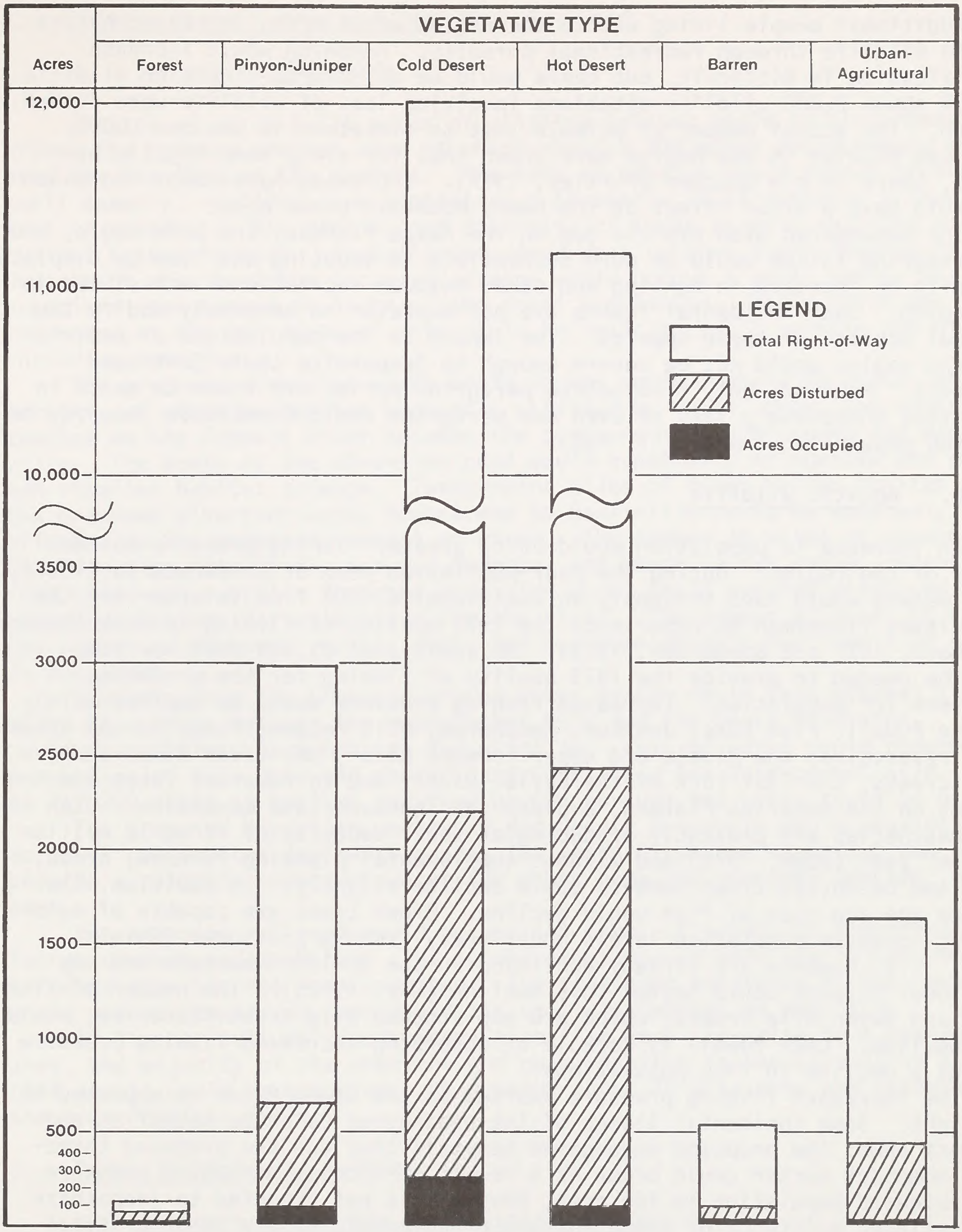
a. Terrestrial Wildlife

The additional people which the proposed project would bring to Wayne County, Utah would increase the hunting pressure on the region's game species. There is no limit on the number of hunting permits issued for lion, bear, bull elk, and buck deer. Harvest of antlerless elk and deer, bighorn sheep, bison, and antelope is controlled.

According to Shields (1976), most deer herds in Utah are already hunted to capacity. Additional hunting pressure could reduce deer populations below their present levels. The decline in the affected deer populations cannot be quantified as current numbers are unknown. The decline would affect the recreational resource.

Upland game and waterfowl (Figures 2-18 and 2-19) would also be placed under heavier hunting pressure. If the IPP population were to follow established state-wide hunting trends, pheasants and upland game in the region would have to withstand only a 2 to 5 percent average increase in harvest over the life of the project in order to maintain the 1975 quality of hunting (Nish, 1975 and Hudson and Thayn, 1977). Declines in upland game populations are not expected.

Waterfowl would receive additional hunting pressure mainly at the Bicknell Bottoms Waterfowl Management Area in Wayne County and at Koosharem and Otter Creek reservoirs in Sevier and Piute counties. The influence of regional hunting pressure on migratory populations cannot be accurately predicted, but resident populations are small (Jensen, 1974) and would probably decline with increased hunting pressure.



TRANSMISSION SYSTEM RIGHT-OF-WAY BY VEGETATIVE TYPE

FIGURE 3-2

Additional people living within the region would bring increased harassment to wildlife through recreational pursuits. Poaching would increase. Quantification is difficult, but there would be an adverse effect on wildlife. In 1974 about 3,000 wildlife citations involving loss of wildlife were issued in Utah. The actual number of animals lost to violators is unknown (UDWR, 1974),but studies in New Mexico have shown that for every deer legally harvested, there is one poached (Pursley, 1977). Increased harassment and poaching could have a minor effect on the Henry Mountain bison herd.

The endangered Utah prairie dog on the Awapa Plateau, the bald eagle, and the peregrine falcon would be more susceptible to shooting and loss by displacement with an increase in hunting and other outdoor recreational activities in the region. Such incidental losses are not expected to adversely modify the critical habitat of these species. The impact on the populations of prairie dogs and eagles would not be severe enough to jeopardize their continued existence. However, only five active peregrine eyries are known to exist in Utah, thus unnecessary loss of even one peregrine could constitute jeopardy to the Utah population (John Gill, FWS).

b. Aquatic Wildlife

An increase in population would bring greater fishing pressure to the waters of the region. During the peak population year of construction (1987), these waters would have to supply an additional 87,400 fish in order for the IPP related fisherman to experience the 1973 quality of fishing in Utah (Hudson and Thayn, 1977 and Bangerter, 1973). An additional 31,000 fish per year would be needed to provide the 1973 quality of fishing for the projected long-term IPP population. Increased fishing pressure would be applied mainly to Lake Powell; Fish Lake; Johnson, Koosharem, Mill Meadow, Forsyth, and Otter Creek reservoirs; the middle and upper Fremont River; UM, Seven Mile, and Otter creeks; the East Fork of the Sevier River; and to numerous lakes and streams on the Aquarius Plateau, Boulder and Thousand Lake mountains. Utah fish hatcheries are presently producing at their capacity of 11 to 12 million fish per year (UDWR, 1979) and without supplemental planning rainbow, brook, lake, and cutthroat trout numbers could decline slightly. In addition, the average age and size of fish would decline. Brown trout are capable of maintaining adequate population levels under heavy fishing pressures (Shields, 1976). Fish numbers are already declining on the Boulder Mountain and any additional harvest could hasten this decline (May, 1977d). The number of fish in UM and Seven Mile creeks, which are non-stocked wild trout fisheries, would also decline. Lake Powell is capable of absorbing increased fishing pressure without a decline in fish populations.

The increased fishing pressure exerted on the Green River is expected to be slight. Some incidental losses of the endangered Colorado squawfish and humpback chub, the proposed endangered bonytail chub and the proposed threatened humpback sucker could occur as a result of increased fishing pressure. The increased population in the area, however, is not expected to jeopardize the continued existence of these species or adversely modify their critical habitats.

c. Wild Horses and Burros

Additional people and recreational activity in the regional setting could lead to harassment of the 49 wild horses and 24 wild burros in the San Rafael Swell. Because of the vast area and low density of these animals, this would not be a serious problem.

2. Primary Project Area and Coal Haul Railroad

a. Terrestrial Wildlife

A total of about 5,710 acres of wildlife habitat would be disturbed within the primary project area of which about 5,220 acres would remain occupied for the life of the project. The loss of habitat would mainly affect small mammals, reptiles, and amphibians. (Appendix II-13 contains a check list of species.) The density and diversity of these animals reflects a typical desert habitat. Trapping data from Westinghouse Environmental Systems Department show that the occupied acreage would remove a small number of organisms when viewed in light of the total population. Water which may be impounded at the ash disposal site could be toxic to small animals and birds including waterfowl.

The proposed diversion works would occupy approximately 40 acres, or 20 percent, of riparian habitat currently utilized by quail, deer, and non-game species on the Fremont River between the proposed diversion works and Hanksville. The banks of the diversion pond would eventually revegetate and possibly add riparian habitat acreage. Twenty-nine miles of river bottom habitat from the proposed diversion works downstream to Hanksville could be adversely affected by the proposed removal of water. The number of miles of stream bed that would be totally dry between November and March is not known. Recharge from seeps and overflow from the diversion works would provide dispersed watering stations for wildlife along the river. The number of acres of habitat and number of pheasant, quail, deer, and non-game animals that would be affected is not known.

Drawdown from the proposed ground water system could stop natural flow at up to 24 springs between the Waterpocket Fold and the Henry Mountains. This could destroy important habitat for wildlife. Loss of water could reduce the population of mule deer and chukar partridge along the Waterpocket Fold. Up to 147,200 acres of habitat serviced by the springs and seeps could be affected.

The proposed Diversion works and Red Desert Reservoir would provide 1,000 acres of new habitat and resting area for shore birds and waterfowl and would provide a reliable source of water for other game and non-game species in the area.

The proposed railroad would occupy 145 acres of potential black-footed ferret (endangered) habitat. The actual existence of this species in the affected area has not been confined. The continued existence of the species would not be jeoparized, nor would its critical habitat be modified.

If the agricultural lands near Caineville were converted to a residential area, the majority of the pheasant and quail habitat in the Caineville area (434 acres) would be occupied. At present about 25 pheasants are estimated in the area (Dalton, 1977).

3. Power Transmission Systems

a. Southern California Transmission System

(1) Terrestrial Wildlife

The proposed system would cross approximately 91 miles of critical deer winter range and 5 miles of critical elk winter range (Figures 2-B through 2-D). In this 91 miles, about 800 acres would be disturbed of which 51 would be occupied by access roads and transmission towers. The disturbed acreage is

less than 0.1 of 1 percent of the total critical winter range in the herd units crossed. About 103 miles of new access would be created in Utah along the Salt Wash to Jack Henry Junction segment of which about 10 would remain (Figure 2-B).

Deer and elk would be put under stress and some losses could result if construction were to take place during winter months (December through April) on their critical winter range. The new access, if not blocked, would make deer and elk more susceptible to hunting, poaching, and harassment in the future.

Of the potential bighorn sheep habitat in the Beaver Dam Mountains (Figure 2-D), approximately 38 acres would be disturbed of which 2 acres would be occupied by towers and access roads. In Nevada and California about 135 acres of Bighorn habitat would be disturbed and 6 acres would be permanently occupied (Figures 2-E, F, and H through K). This amounts to less than 0.1 percent of the total bighorn habitat in the mountains which would be crossed. Bighorn sheep are tolerant of power lines, but construction of transmission lines between February and May could result in disruption of lambing and loss of bighorn lambs. The magnitude of potential loss is not known but any losses would adversely affect bighorn populations.

Approximately 170 acres of sage grouse habitat would be disturbed in Forsyth Valley (Figure 2-B) and the Dog Valley area of Utah. This is about 0.7 percent of the total habitat in the two areas. If construction were to take place during the mating season (March-April) near strutting grounds, it could destroy grouse production for the year and possibly end future strutting activities on the established strutting grounds. An unknown number of grouse, as they fly to the strutting grounds, could collide with transmission towers. The number of collisions would decrease after the first year as the birds become accustomed to the towers. The towers would also provide perching sites for raptors which would make grouse more susceptable to predation. Loss of grouse would lower populations, but the magnitude of loss cannot be accurately assessed. An existing 345-kV power line in the Dog Valley area has not noticeably affected sage grouse populations. The ferruginous hawks nesting in pinyon-juniper areas, along the Jack Henry to Lincoln Junction segment could be disrupted between March and May. Losses in ferruginous hawk production would be low because ferruginous hawks nest on isolated nests rather than in dense eyries.

If bald eagles (endangered) were displaced from traditional winter roosts in Parowan and Cedar Valleys by construction activities, it could be considered as harrassement and could have an adverse affect on the displaced birds (Joseph, 1979 and Olendorf, 1979).

The disturbed and occupied acres of important habitat for the Utah prairie dog (endangered), desert tortoise (designated as rare in Nevada and under Federal Status Review, Federal Register 8-23-78), and Gila monster (unique), (Figures 2-B through 2-K) are given below in Table 3-6. The continued existence of any threatened or endangered species would not likely be jeopardized by the installation of the Southern California Transmission System. Adverse modification of critical Utah prairie dog habitat would not occur. Disturbance of ground from construction could provide new areas for Utah prairie dogs, as burrowing animals often prefer disturbed sites.

TABLE 3-6

Disturbed and Occupied Habitat
of Unique, Rare and Endangered Species

Species	Acres Disturbed	Acres Occupied
Utah prairie dog	849	54
Desert tortoise	312	15
Gila monster	1,040	60

Bendire's thrasher and gilded flicker have a limited distribution in California. About 43 acres of their habitat would be disturbed and 2 acres occupied by the proposed line in the Cima Dome Joshua tree area. Disturbance during the breeding and nesting season (May through August) would adversely affect the populations of these birds.

Construction activities would destroy burrows and nests of the Utah prairie dog, desert tortoise, gila monster, and other species and reduce vegetation cover and food sources. Some individual animals would be killed by machinery, and others would be forced into new habitations and territories where they may be more susceptible to predation or unable to compete with other species. The population densities for these species and the actual number of animals that would be lost in the disturbed areas is unknown. The actual percent of total habitat that would be affected is extremely small and never exceeds 0.1 of 1 percent of the total available. However, any loss of threatened or endangered species would be important.

Transmission line poles provide perching sites for raptors and can be beneficial to their hunting success. However, it is known (Ellis, et al., 1969) that raptors also become targets when perched on poles near roads. The number of raptors that would be lost due to shooting along the new access cannot be accurately predicted.

Overall, the Southern California transmission system (along 905 miles) would disturb about 5,460 acres of habitat for small mammals, birds, reptiles, and amphibians of which 340 acres would remain occupied for the life of the project.

(2) Aquatic Wildlife

The construction and operation of the proposed power lines would have no effect upon the rare (State of Nevada classification) and endangered fish in the Muddy and Mojave Rivers (Selby, 1977). Introduced access could lead to additional fishing pressure on UM creek and a deterioration of the wild trout fishery.

(3) Wild Horses and Burros

The effects of powerline construction on wild horses and burros would be temporary. These animals could be forced out of habitual grazing or trailing areas for a few days or weeks. Because horses and burros are adaptable to

temporary disturbances, it is not expected that the construction or operation of IPP powerlines would result in the loss of any wild horses or burros.

Only a minute portion of the total forage available to wild horses and burros along the proposed routes would be altered. The introduction of new access roads in wild horse range could lead to additional harassment and loss of animals. Because of the low density of wild horses and burros in the affected areas, this would not be a serious problem.

b. Utah Transmission System

The Lincoln Junction to the Gonder sub-station segment of the Utah system would pass through approximately 25 miles of critical deer winter range in Muleshoe Valley and 31 miles of sage grouse habitat in Steptoe Valley (Figure 2-M). The construction and presence of the Utah transmission system would have the same types of effects on deer and sage grouse as discussed in conjunction with the Southern California transmission system.

Known raptor nesting areas occur along the Lincoln to Gonder segment, i.e., Schnell Creek range. Isolated ferruginous hawk nesting sites could be located in pinyon-juniper foothills along the route. If construction activities occurred during the nesting season, then nest abandonment and decrease in hawk production would likely occur for one year.

The Paragonah substation to Bald Hills Junction segment (16 miles) lies within Utah prairie dog habitat. It would disturb 46 acres (less than 0.005 percent of the available habitat) and occupy 5 acres. The effects of Utah transmission lines on small mammals would be the same types as discussed with the Southern California transmission system. If bald eagles (endangered) were displaced from traditional winter roosts in Parowan Valley by construction activities, it would be considered as harrassment and could have an adverse effect on the displaced birds (Joseph, 1979 and Olendorf, 1979)

The Salt Wash to Emery power plant segment would disturb about 134 acres of potential black-footed ferret (endangered) habitat of which 14 would remain occupied. The actual existence of the ferret in the area has not been proven.

The independent segments of Utah transmission system (along 185 miles) would disturb about 610 acres of habitat suitable for small mammals, birds, reptiles, and ampibians of which 80 would remain occupied for the life of the project. About 17 miles of access along the independent segments of the Utah transmission system would be left open where raptor shooting could occur.

Wild horses along the Lincoln to Gonder segment of the Utah transmission line would be subject to the same types of impacts discussed with the Southern California transmission systems.

H. CULTURAL RESOURCES

1. Regional Setting

Vandalism to the cultural values known to exist in the region (821 archaeological sites) would result from the increased numbers of people associated with the proposed project. Several of the 45 sites listed as eligible for the National Register of Historic Places could be affected. Such activity is impossible to quantify but would result in a loss of scientific and educational values.

2. Primary Project Area and Coal Haul Railroad

Activities associated with the construction and operation of various facilities within the primary project area could adversely affect 29 known archaeological sites. None of these are eligible for inclusion in the National Register of Historic Places. Thirteen known archaeological sites could be impacted by railroad construction. Four of these are eligible for National Register inclusion.

Wherever possible and feasible, cultural resources would be avoided by shifting construction and related activities. If this is not possible, the BLM would consult with the appropriate State Historic Preservation Officer to determine the most satisfactory means of mitigating damage. Even with present salvage techniques, some scientific and educational information could be inadvertantly lost.

3. Power Transmission Systems

a. Southern California Transmission System

Construction and maintenance activities associated with the transmission lines could damage or destroy prehistoric and historic sites. There are 274 sites that have been identified along the proposed routes. Sixty-three of these sites are included in or meet the criteria for inclusion in the National Register of Historic Places. The introduction of visual elements out of character with the Caliente Railroad Depot, Lincoln County, Nevada, would detract from the historic setting of this site. It is currently (April, 1979) listed on the National Register of Historic Places. Figures 2-B through 2-I show the approximate locations of these sites.

Wherever possible and feasible, cultural resources would be avoided by shifting construction and related activities. If this is not possible, the BLM would consult with the appropriate State Historic Preservation Officer to determine the most satisfactory means of mitigating damage. Even with present salvage techniques, some scientific and educational information could be inadvertantly lost.

b. Utah Transmission System

Construction and maintenance activities associated with the transmission lines could damage or destroy prehistoric and historic sites. One hundred and seventy-six sites have been identified along the proposed routes. Twenty-five of these sites are included in or meet the criteria for inclusion in the National Register of Historic Places.

Figures 2-D through 2-M show the approximate locations of these sites.

Wherever possible and feasible, cultural resources would be avoided by shifting construction and related activities. If this is not possible, the BLM would consult with the appropriate State Historic Preservation Officer to determine the most satisfactory means of mitigating damage. Even with present salvage techniques, some scientific and educational information could be inadvertantly lost.

I. RECREATION AND AESTHETICS

1. Regional Setting

a. Recreation

The major recreation attractions within the regional setting (Table 2-10) would receive increased use by the new population. Some recreation sites may develop sanitation and garbage problems. The appeal of major attractions near to the power generating station (e.g., proposed Hondu Primitive Area and Capitol Reef National Park) may be reduced to some visitors. With additional population, off-road vehicle (ORV) use would increase.

If all developed recreation sites (camping and picnicking) were used equally, existing sites would be sufficient to serve the new population. However, use of developed sites would tend to follow past use patterns. Additional recreational pressures would most often occur at sites presently being used at greater than 20 percent of their design capacity, increasing use to 40 percent or more at many of the sites, which would result in overcrowding and deterioration of the environment and facilities. Overcrowding and deterioration would be intensified at sites presently being used at greater than 40 percent capacity (see Table 2-12).

The increase in permanent population would result in an estimated additional 1,430 fishermen in the region (Hudson and Thayn, 1976). There would be an estimated increased demand for 31,000 fish annually, and increased stocking would be needed to maintain present fisherman success. An estimated additional 605 hunters would be afield annually to harvest deer and elk. An additional estimated 270 hunters would be afield in pursuit of upland game (Hudson and Thayn, 1976). Table 3-7 lists the anticipated impacts to hunting and fishing on an annual basis. The additional competition for available fish and game would most likely lead to less hunter and fisherman success, and would result in dissatisfaction with the recreation experience.

Recreational facilities in towns in the region would become overcrowded. Additional municipal facilities including 7 to 13 acres of city parks, swimming pools, tennis courts, and a 9-hole golf course would be needed to meet minimum standards (BOR, 1967).

b. Aesthetics

Upper portions of the two 750 foot high stacks, their aircraft warning lights, and any visible emissions from the stacks could be seen from distances varying from 8 to 20 miles including portions of Highway U-24, Fishlake National Forest, Capitol Reef National Park, and the proposed Hondu Primitive Area on the San Rafael Swell. Man-made contrast of the stacks would be low, but water vapor emissions from the stacks could at times produce high contrast. The buildings would be screened by surrounding buttes.

Atmospheric discoloration and reduction in visual range would degrade scenic value of high quality scenic areas in the regional setting. Visual range in Capitol Reef and Canyonlands National Parks could be reduced from 87 miles to between 80 and 84 miles for 7 to 11 days per year. For the balance of the year, visual range would be reduced less than 3 miles in Capitol Reef and less than 4 miles in Canyonlands.

TABLE 3-7

Potential Hunter and Fisherman Impacts

Project Year	Projected IPP Population	Projected Annual Increase in Numbers: Deer Hunters	Elk Hunters	Upland Game Hunters	Fishermen	Increased Demand for Fish[a]
1982	790	140	15	70	355	7,700
1987	8,950	1,570	150	760	4,025	87,400
1990	3,170	555	50	270	1,430	31,000

Source: Hudson and Thayn, 1976.

[a]Figures are rounded to the nearest 100.

Assumptions made are:

1. The percent of the new people involved in outdoor recreation would be as indicated in UDWR harvest records and surveys and in the current Utah population projections.

2. All of the population would be new to the area.

3. The recreational pursuit would occur within the regional setting.

2. Primary Project Area and Coal Haul Railroad

a. Recreation

The plant site, Red Desert Reservoir, Fremont River Diversion, well field, railroad, borrow areas and associated development would remove about 5,220 acres of land currently available for ORV use.

When not severely drawn down, the Red Desert Reservoir could provide an area for water related recreation pursuits. Without management, recreational use of the area could cause litter and sanitation problems.

b. Aesthetics

When not drawn down, the Red Desert Reservoir could be a visually pleasing variation in the landscape as seen from Highway U-24.

The coal haul railroad would be visible (medium contrast) from the proposed Hondu Primitive Area, and would create high man-made contrast in the Middle Desert Wash. The railroad crossing of Interstate Highway 70 (I-70), a scenic tourist route, would be highly visible (high contrast) to passengers in approximately 1,300 vehicles daily (see Figure 2-A). One of the proposed railroad borrow areas would be visible (medium contrast) from I-70.

3. Power Transmission Systems

a. Recreation

The presence of the transmission lines could cause a reduction in quality of the recreation experience for some people visiting the 25 recreation attractions adjacent to the proposed transmission systems (Figure 2-23).

b. Aesthetics

The transmission lines would cause man-made contrast in or near visually sensitive areas such as major travel routes, primary highway crossings, high quality scenic areas, communities, or in areas with recreational values. Where proposed transmission lines would parallel existing lines, additional contrast would generally not add appreciably to present contrast, but would make disturbance more obvious. Where metal towers are combined with existing or proposed wood towers, visual contrast would be obvious. This would occur on the plant site to Jack Henry Junction, Jack Henry Junction to Lincoln Junction, and Jack Henry to St. George segments.

The transmission system would cross major highways in 36 locations. Table 3-8 shows numbers of vehicles that would pass by the transmission lines daily and the anticipated contrast rating at each crossing.

In Utah, the Jack Henry Junction to Cedar Wash segment would parallel I-15 (mileposts 1-85, Figure 2-H) and would be visible (medium to high contrast) to travelers in 4,515 to 7,800 vehicles daily. Between the plant and Cedar Wash, transmission lines would also be visible (medium to high contrast) to residents of Fremont, Kingston, Enoch, Cedar City, Harrisburg, St. George, and Santa Clara. In Nevada, the Cedar Wash to Gypsum Junction segment would parallel I-15 (mileposts 45-75, Figure 2-H) and would be visible (medium to high contrast) to travelers in 6,645 vehicles daily. In Nevada, the Lincoln Substation to Gypsum Junction segment would parallel U.S. 93 (mileposts 70 to 115) and would be visible (high contrast) to travelers in 655 to 700 vehicles

TABLE 3-8

Average Daily Travel and Anticipated Contrast
at Proposed Power Transmission Line Highway Crossings

	Primary Highway Crossings			Secondary Highway Crossings		
Route Segment	Highway	ADT[a]	Anticipated Contrast	Highway	ADT[a]	Anticipated Contrast
1. Salt Wash Site-Emery	1 (I-70)	1,575	High	--	--	--
2. Salt Wash Site-Jack Henry Junction	1 (I-15)[b]	4,600	High	1 (UT-24)	590	High
	1 (US-89)	1,585	High	2 (UT-62)	220	High
					320	High
				1 (UT-20)	320	High
3. Jack Henry Junction-Cedar Wash	2 (I-15)	5,370	High	1 (UT-130)	250	High
		4,940	High	1 (UT-56)	1,100	High
				2 (FAS-382)	400	High
					500	High
				1 (UT-18)	870	
4. Cedar Wash-Gypsum Junction	1 (US-91)	--	Medium	1 (NEV-7)	490	Medium
	1 (I-15)	12,220	Medium			
5. Jack Henry Jct.-Lincoln Junction	1 (US-93)	790	High	1 (UT-130)	250	High
6. Lincoln-Gypsum Junction	1 (I-15)	6,645	High	1 (NEV-7)	65	High
	2 (US-93)[b]	700	High			
		655	High			
7. Gypsum Junction-El Dorado	1 (US-93 95)[b]	10,400	Low	2 (NEV-41)	1,150	Low
					1,050	Low
8. El Dorado Junction-Victorville Line 1	3 (I-15)[b]	9,950	Low	1 (CA-127)	600	Low
		12,000	Low			
		16,200	Low			
	1 (I-40)	6,700	Low			
9. El Dorado-Victorville	1 (I-40)[b]	5,900	Low	1 (NEV-68)	375	Low
	1 (I-15)	16,200	Low			
10. Lincoln SS-Gonder SS	2 (US-93)	835	High			
		2,060	High			

[a]Source: 1975 Annual Traffic Volume Reports, California; 1977 Annual Traffic Volume Report, Nevada; 1978 Annual Traffic Volume Report, Utah.

[b]Highway crossing would parallel existing transmission lines.

daily. It would also create a "tunnel effect" for 45 miles in combination with the existing transmission line on the opposite side of U.S. 93. In Nevada, the Gypsum Junction to Eldorado segment would be visible (low contrast) from residential areas of Henderson. In California, the southern line would be visible (medium contrast) from housing developments in the Apply Valley area.

The lines would be visible from within portions of 25 recreation attractions or areas of high scenic quality as follows:

Recreation Attraction	Anticipated Contrast
Hondu Primitive Area	Low
Otter Creek Reservoir	Low
Red Mountain	Low
Cathedral Gorge State Park	Low
Cima Dome	Low
Devils Playground	Low
Pisgah Crater	Low
Lake Mead National Recreation Area	Low
Virgin River Recreation Land	Low
Joshua Tree Natural Area	Medium
Pahranagat National Wildlife Refuge	Medium
Desert National Wildlife Refuge	Medium
Highland Mountains	Medium
Sunrise Mountain	Medium
Muddy Mountains	Medium
Fremont River Complex	High
Thousand Lake Mountain	High
Pine Valley Mountain Foothills	High
Cave Lake State Park	High
Commins Lake	High
Ward Charcoal Ovens State Park	High
Echo Canyon State Recreation Area	High
Panaca Charcoal Kilns	High
Sidewinder	High
Mahogany Mountain	High

Recreational values would be reduced for some visitors.

The lines would be visible from portions of two RARE II wilderness recommendation areas, 29 BLM Wilderness Study Areas (WSA), 9 uninventoried BLM roadless units, and the BLM proposed Hondu Area as identified along the proposed routes (Table 2-15 and Figure 2-26). The increase in man-made contrast would be low from all areas except WSA NV-040-172 (Far South Egans), WSA NV-040-169 (Mt. Grafton), WSA NV-040-172 (South Egan Range), WSA NV-050-IPP-07 (Delamar Mountain) and all uninventoried BLM roadless units, where the increase in contrast would be high when viewed from portions of the areas, and WSA NV-050-IPP-07 (Arrow Canyon), WSA NV-050-IPP-15 (Muddy Mountain) WSA UT-040-046 and RARE II 4259 (Pine Valley Mountain) where the increase in contrast would be medium when viewed from portions of the areas.

4. Microwave Sites

The Elkhorn Station and power line would be visibile (high contrast) when viewed from an adjacent visitor access road, and would reduce the aesthetic

values of the area to some visitors. The Moroni Station would be visible (high to low contrast) from portions of the proposed Hondu Primitive Area, and would reduce the aesthetic qualities of the area to some visitors.

J. LAND USE

1. Regional Setting

Since Caineville is within 10 miles of the proposed generating complex, employees moving into the area would likely purchase property there. All of the 434 acres of irrigated land could be subdivided into small non-agricultural developments. This represents 37 percent of the irrigated land east of Capitol Reef National Park in Wayne County, Utah (Bureau of Economic and Business Research, 1976).

Two USFS RARE II Final Environmental Statement Wilderness Recommendation areas, four National Park Service Wilderness Proposal areas, and uninventoried BLM roadless units, including those identified as having potential for special designation (as listed on Table 2-14 and shown on Figure 2-25) may receive additional ORV and other visitor use, resulting in degradation of wilderness values.

The 1975 average daily traffic (ADT) of 320 vehicles per day on Utah Highway 24 just each of Capitol Reef National Park could more than double during the peak construction period for the proposed project. Traffic through the park during the operational period for the power plant could be about one-third the increase experienced during the construction phase.

Truck traffic on Highway U-24 through Capitol Reef National Park would increase to provide goods and services to the project site and to the new residents. The increase in traffic through the park would likely increase both the total number of accidents and also the accident rate.

2. Primary Project Area and Coal Haul Railroad

The 4,640-acre plant site and 1,080 acres within the favored town site would change from federal to private ownership. The proposed sale of 4,640 acres of public land for the plant site would reduce federal ownership in Wayne County east of Capitol Reef National Park by about 0.54 percent. For the duration of the project, the only environmental impact tied directly to sale of the land (as opposed to granting a right-of-way) would relate to the increase in the local property tax base. The tax base in Wayne County would be slightly greater than if IPP were granted a right-of-way for the plant. According to the applicant, the principle reason for requesting purchase is to obtain financial security for borrowing funds to construct the project (personal communication, Campbell, 1978).

With a sale, the federal government would relinquish control of land uses which could occur in the long-term should the plant be abandoned or removed; however, local county zoning would apply.

With respect to the sale criteria stated in FLPMA, the proposed 4,640 acres that would be sold are:

1. Not difficult or uneconomic to manage, and are not suitable for management by another federal agency, or

2. Not (previously) acquired for a specific purpose, or

3. Of potential value for serving important public objectives, including but not limited to expansion of communities and economic development. The environmental impact analysis in this statment does not determine whether or not such objectives can better be served on other than public land or by maintaining the plant site in federal ownership.

The sale of the 1,080 acres of public land for the new town site would reduce federal ownership in Wayne County east of Capitol Reef National Park by about 0.06 percent. The town site would also meet the FLPMA Criteria.

Though other federal lands would not change ownership, rights-of-way would be issued which transfer certain privileges to the grantee. Privileges granted would vary from virtually complete within the fenced portion of the plant site, to loss of surface resources on those areas occupied by structures, to very minor along unfenced undisturbed portions of linear facilities. In any case, the Federal Government would be limited in issuance of additional rights-of-way on those areas committed to IPP.

Should the project be completed there would be a loss of land uses on federal land as follows:

Recreation: Commitment of land to private ownership, permits, and rights-of-way: 13,980 acres; 4,220 acres occupied (terrestrial use)--This represents a loss of approximately 1 percent of the recreation lands in the primary project area. Should the Red Desert Reservoir be constructed, approximately 1,000 acres of new water surface would be available for water based recreation.

Grazing: 5,220 acres occupied by facilities--assuming an average stocking rate in the primary project area of 36 acres per AUM there would a loss of 145 AUMs forage within allotments affecting 43 stockmen. This would reduce estimated available forage less than 0.5 percent in the project area.

About 147,200 acres are served by springs, seeps, and wells. Should the 23 springs and seeps and four wells be dried up, approximately 4,089 AUMs would be lost. This would reduce grazeable forage about 17 percent in nine allotments. Impacts from loss of water could extend 50 years beyond termination of ground water pumping.

Mining: 1,080 acres--Thirty-three mining claims have been located on the new town site. Should valuable minerals be found, mining could be eliminated.

Approximately 11 miles of railroad would be built across private agricultural lands. This would change 133 acres of agricultural land to industrial uses in Emery County. Emery County has 38,604 acres of agricultural land (Bureau of Economics and Business Research, 1976). The railroad would occupy about 0.5 percent of the irrigated lands in the county.

The construction of the railroad would impair any wilderness character (naturalness) within the following four roadless units shown on Figure 2-A: UT-060-007, UT-060-009A, UT-060-010, UT-060-013. Because their suitability for wilderness designation would be impaired, construction would not be allowed prior to completion of the wilderness review.

3. Power Transmission Systems

Should IPP be issued rights-of-way as proposed, the government would be limited in authorizing additional uses on the 24,613 acres of right-of-way that would be committed to IPP for the proposed transmission lines.

Since no active mining or drilling operations have been identified within the proposed power transmission system routes, the probability of land use conflicts between commercial mineral extraction and construction and operation of IPP's power transmission systems is low. Normally introduction of power-lines and a source of power near mineral resource areas is beneficial to development (Bureau of Mines, 1978).

The construction of power transmission lines would impair wilderness character (i.e., naturalness) and designation suitability adjacent to the proposed power transmission system in the following areas (see Figure 2-26 and 2-B to 2-M): BLM Wilderness Study Areas, 1) NV-040-172, Far South Egan (approximately 1/2 mile within area for 3 miles) 2) NV-040-169, Mt. Grafton (approximately 1/4 to 1/2 mile within area for 20 miles), 3) NV-050-IPP-07, Delamar Mountain (approximately 200 feet within area for 14 miles), 4) NV-050-IPP-15, Muddy Mountain (approximately 339 feet into the unit for 4 miles) and 5) WSA UT-040-057-AZ-010-004 (approximately 330 feet within WSA for 10 miles. The construction of power transmission lines would impair any wilderness character (i.e., naturalness) and designation suitability adjacent to the lines in nine uninventoried roadless units, UT-060-007, UT-060-009 A, UT-060-009B, UT-060-010, UT-060-012, UT-060-013, UT-060-014, UT-060-015, and NV-040-169.

Any impairment of wilderness suitability would not be allowed prior to completion of BLM's wilderness review and congressional decision on areas having wilderness character. Wilderness suitability would not be affected in any other area with wilderness potential that has been identified along the proposed power transmission system.

4. Microwave System

Should the proposed Moroni Station be built, primitive values within a portion of the proposed Hondu Primitive Area would be lost.

K. LAND USE PLANS AND CONTROLS

1. Coordination With Existing Land Use Plans

Planning for federal land use has been done by both the Forest Service and the Bureau of Land Management for lands which would be affected by the generating facilities and the transmission lines. This planning has been done over about a 20-year period and is continuing. Some plans are newly revised and include consideration of the IPP proposal. The majority of plans, however, were prepared prior to the proposal and did not consider it. Both Forest Service and BLM planning systems allow for consideration of new proposals.

The proposed plant site and transmission corridors were compared with the existing planning documents and all significant conflicts have been covered in appropriate sections of this statement. Power transmission line conflicts are highlighted in Table 3-9.

Alternatives are presented in this environmental statement which would avoid conflicts for some planning units. Other plans would require revision in order for the conflicts to be resolved. Any revisions would be made following agency regulations, procedures, and policies. For BLM (inasmuch as new

TABLE 3-9

Land Use Planning Concerns
Along Proposed Transmission Line Segments

Name of Land Use Plan[a]	Potential Land Use Conflicts
San Rafael	(Figure 2-M)--Land use recommendation for the San Rafael MFP is that visual intrusions in the foreground of I-70 be buried. The Salt Wash to Emery segment of the proposed Utah System would not be buried.
Beaver	(Figure 2-C)--Land use recommendation for the Beaver Plan is that all future utility lines follow existing corridors. The Jack Henry Junction to Bald Hills Junction segment would not be within a designated corridor.
Mud Springs	(Figure 2-C)--Land use recommendation for the Mud Springs plan is that all future utility lines follow existing corridors. The Jack Henry Junction to Bald Hills Junction segment would not be within a designated corridor.
Virgin River	(Figure 2-D)--The land use plan states that no additional power lines will be allowed through this part of the proposed route (Black Ridge to St. George).
Grand Wash	(Figure 2-F)--A scientific study area has been designated by the Bureau of Land Management in an area crossed by the Cedar Wash to Gypsum Junction segment of the Southern California Transmission System. Probably the highest concentration of desert tortoise in the Arizona Strip District is located here.
Pinyon	(Figure 2-C)--The line through this area deviates from established corridors (Mahogany Mountain).
Caliente	(Figure 2-C)--The line through this area deviates from established corridors (Mahogany Mountain).
East Mojave	(Figure 2-J)--Though the Bureau of Land Management has not yet stated its position, there is public interest for giving national park status to this area (Cima Dome). There are, however, three power lines already in this corridor. The proposal would be the fourth.
Stoddard	(Figure 2-K)--The placement of the line through this area would violate land use planning goals as it would be placed in a corridor where no lines now exist (Sidewinder).

[a]All are Bureau of Land Management plans.

planning regulations have not been finalized) a policy would be followed which would utilize the environmental statement process as a mechanism for considering planning recommendations and trade-offs. An approval of the proposal or alternatives analyzed in the environmental statement would also be a decision to amend the plan (or plans if more than one is involved).

2. Regional Setting

Under the Wayne County draft zoning ordinance, all of the IPP related project components would be located in areas designated as agricultural and open space. If the IPP generating station were built in Wayne County, the County Commissioners have indicated that they would update the draft ordinance and adopt it to accomodate IPP and regulate development in the County (Siebert, 1979).

3. Primary Project Area and Coal Haul Railroad

The I-70 railroad crossing would conflict with visual resource management objectives recommended in the BLM San Rafael Resource Area Management Framework Plan (includes Last Chance, Muddy, and Huntington planning units), which recommends burial of visual intrusions in the foreground of I-70.

4. Power Transmission Systems

Several areas of special concern have been identified from various land management plans and proposals along the proposed transmission corridors (see Table 3-9). Location of these areas of concern are shown on Figures 2-B through 2-M.

L. HUMAN RESOURCES

1. Regional Setting

Portions of the following analysis were developed by the State of Utah, Office of the State Planning Coordinator (UPC, 1978).

a. Population

The geographic isolation of Wayne County, the small size and lack of diversity of the local economy, and the sparse settlement of the area, combine to make a case for which a parallel is not available. Since the actual place of residence and amount of service that would be provided to workers cannot be accurately assessed, three scenarios were used to assess the population changes that could occur in Wayne County under peak construction conditions (UPC, 1978).

The first scenario assumes that all construction workers would live in Wayne County and that those industries which serve the local population, often referred to as "secondary" or "residentiary" employment, would be greater than, but consistent with, current county conditions. This means that Wayne County residents would continue to travel to points outside the county, such as Richfield, Utah, to purchase goods and services not locally available. The resultant peak Wayne County population which would occur in 1987 is 9,174 (UPC, 1978).

The second scenario also assumes that all workers would live in Wayne County, but allows a more reasonable level of residentiary employment. The assumption is that new firms would be established in the county during the construction period and that regional trading relationships would be altered. In general, the more the local economy could supply its residents and businesses with goods and services, the larger would be the population which would result from the addition to basic employment. This case would be consistent with the development of a new town, but could also occur without a new town. A peak 1987 population of 10,800 for Wayne County would result. The IPP related population increases with Scenerio II is given in Table 3-10. Table 3-11 shows the population distribution in the county if a new town were built and Table 3-12 shows the distribution without a new town (UPC, 1978).

The third scenario assumes that about 40 percent or 1,000 of the temporary construction workers would commute to the work site from outside the county. The same level of residentiary employment as in the second scenerio is assumed. This combination of assumptions yielded the lowest 1987 peak population prediction, 7,004 (UPC, 1978).

Because Scenario II most accurately reflects both the preference of county officials (new town) and a "worst case" (greatest population increase), it is used as the basis for the analysis of impacts to human resources (UPC, 1978).

b. Employment

Table 3-13 outlines the basic and residentiary jobs that would result during peak construction (1987) for each employment sector whether or not a new town were built (UPC, 1978).

The total number of jobs and the percentage of the total number by sector, for the years 1982, 1987, and 1990, are shown in Table 3-14. The percentage allocation by sector reveals the relative shifts in the importance of the sectors that would occur with construction of IPP. By 1990, for example, the Wayne County economy would shift somewhat from its dependence upon government, trade, services, and agriculture and would depend more on construction and transportation, communication, and utilities. The county's economic base would be improved by the corresponding increase in employment opportunities (UPC, 1978).

Increased employment opportunities would enable the local economy to supply greater amounts of labor. The present ability of the County to supply labor to the labor market is limited by the small numbers of persons residing within commuting distance of the project. A large-scale in-migration would, therefore, be required. Labor market changes would include a decrease in proprietorships, particularly in the agricultural sector. A decrease in unemployment, part-time and dual job holding would also result. The rate at which area residents participate in the labor force would increase (UPC, 1978).

c. Income

As shown on Table 3-15, per capita income in Wayne County would be 72 percent greater in 1987 and 30 percent greater in 1990 if IPP were built than if it were not. The amount of increase would be dependent upon county employment conditions because average wages vary greatly sector to sector. The 1987 conditions would be affected by the construction sector with its very high average wages. Wages in 1990 would be influenced less by the construction sector than by the transportation-communication-utilities sector which contains

TABLE 3-10

Projected IPP Population Related Increases

Year	Projected Wayne County Population With Project	Projected Wayne County Population Without Project	IPP Related Population Increases
1982	2,660	1,870	790
1987	10,800	1,850	8,950
1990	5,000	1,830	3,170

Source: Compiled from data provided by UPC, 1978.

TABLE 3-11

Distribution of Population in Wayne County Communities
Assuming Construction of a New Town

	1982	1987	1990
New Town	672	7,608	2,686
Bicknell	318	512	368
Loa	418	670	484
Torrey	119	190	137
Unincorporated	1,133	1,820	1,325
Total	2,660	10,800	5,000

Source: UPC, 1978.

TABLE 3-12

Distribution of Population in Wayne County Communities,
Without New Town

	1982	1987	1990
Bicknell	756	3,024	1,400
Loa	702	2,808	1,300
Torrey	702	2,808	1,300
Unincorporated	500	2,160	1,000
Total	2,660	10,800	5,000

Source: UPC, 1978.

TABLE 3-13

Projected Employment in Wayne County, 1987, Under Scenario II
Corresponding to the IPP Construction Peak

	Reasonable Residentiary Service; All Construction Workers Reside in Wayne Co. (Jobs, Full and Part Time)		
	Basic	Residentiary	Total
Agriculture	121	27	148
Mining	68	5	73
Construction	2,438	220	2,658
Manufacturing	7	61	68
T.C.U[a]	333	85	418
Trade	53	649	703
F.I.R.E.[b]	4	93	97
Service	116	285	401
Government	54	597	651
Total	3,194	2,022	5,216
Labor Force		4,940	
Population		10,800	

Source: UPED-SAFE Model Projections, Bureau of Economic and Business Research, University of Utah.

[a]Transportation, Communications, and Utilities.

[b]Finance, Insurance, and Real Estate.

TABLE 3-14

Distribution of Projected Wayne County Employment[a]

	1982 With IPP[b]		1987 With IPP[b]		1990 With IPP[b]	
	Number	Percent	Number	Percent	Number	Percent
Agriculture	150	10.1	150	2.8	110	4.8
Mining	50	3.4	70	1.4	30	1.4
Construction	820	54.5	2,660	50.9	460	19.6
Manufacturing	20	1.6	70	1.3	40	1.6
T.C.U.[c]	30	1.7	420	8.0	680	28.8
Trade	110	7.4	700	13.5	370	15.6
F.I.R.E.[d]	20	1.3	100	1.9	60	2.6
Services	110	7.1	400	7.7	230	9.6
Government	190	12.9	650	12.5	380	15.9
Total	1,500		5,220		2,370	

Source: UPED-SAFE Model Projections, Bureau of Economic and Business Research, University of Utah.

Note: Details may not add to totals because of independent rounding.

[a]Number of jobs, full and part-time.

[b]Represented by Scenario II.

[c]Transportation, Communication, and Utilities.

[d]Finance, Insurance, and Real Estate.

TABLE 3-15

Earnings and Personal Income Projections[a] for Wayne County
(In Thousands of 1975 Dollars)

	1982 With IPP	1987 With IPP	1990 With IPP
Total Earnings	18,742	56,388	36,130
Agriculture	584	602	569
Mining	866	1,342	424
Construction	11,981	32,591	9,033
Manufacturing	242	535	394
T. C. U.[b]	554	6,897	12,544
Trade	1,445	5,620	4,950
F.I.R.E.[c]	274	1,010	1,004
Services	863	2,651	2,287
Government	1,932	5,140	4,926
Personal Income	22,572	65,245	43,417
Net Earnings	18,000	53,815	34,558
Property Income	2,396	5,990	4,643
Transfer Payments	2,176	5,440	4,216
Per Capita Personal Income	7,054	8,156	7,003

Source: UPED-SAFE Model Projections; Utah Department of Employment Security Wage Data; and Bureau of Economic Analysis, Regional Economic Information System File.

[a] Earnings in each employment sector have been adjusted for an increase of 2 percent per year in productivity.

[b] Transportation, Communication, and Utilities.

[c] Finance, Insurance, and Real Estate.

the plant operation and maintenance workforce. The average wage for this sector is not as high as in the construction sector (UPC, 1978).

d. Infrastructures

IPP endorses construction of a new town, with primary planning and development responsibility being that of local elected officials. During the early years of the project, prepayment of sales and use taxes by IPP would be insufficient to support the new community endeavor (UPC, 1978). It is assumed by IPP and local officials that over time the project would create a Wayne County bonding capacity of sufficient size to finance the debt required to construct necessary public facilities, including water, sewer, etc. However, even prepayment of sales and use taxes by IPP would be insufficient to support the new community endeavor during the early years of the project (UCP, 1978).

New town construction, if properly planned and timely constructed would provide housing and services required by the construction work force. The success of the new town in this regard would be dependent upon adequate planning and zoning, to concentrate community-level impacts there while preventing the random dispersion--and associated high public costs--of mobile home or similar dwelling units (UPC, 1978).

It has been assumed that about 85 percent of the project-induced population would reside in the new town and 15 percent would live in existing communities or in the County's unincorporated area.

(1) Public Utilities, Safety and Health

The distribution of population throughout the county would be different with and without the new town (see Tables 3-13 and 3-14). The impacts of IPP on community services and safety would also differ (UPC, 1978).

(a) Impacts with New Town

If the new town were constructed in accordance with preliminary estimates of public facilities (see Table 1-16), it would be larger than any existing community within reasonable commuting distance of the project site and thus could provide public services at a level and quality not otherwise to be expected. This would be due principally to construction of medical, police, and fire facilities. Water sewage and solid waste disposal could be handled in conformance with state standards (UPC, 1978).

If the new town were built, the impacts on existing communities would be greatly reduced during construction years. As the operation and maintenance phase is reached (1990), the communities might not be much larger than they otherwise would have been (see Tables 3-13 and 3-14) (UPC, 1978).

After 1990, these communities would be roughly 25 percent larger than they would have been had IPP not been built. By itself, this would represent a small rate of growth (2.1 percent per year) over the 10-year period between 1980 and 1990. In each case, the communities could handle such growth--with the exception of sewer disposal problems in Torrey. This population increment is not large enough to warrant changes in the present public service expansion plans (UPC, 1978).

Other studies (Zehner, et al., 1974) do not indicate that the new community would offer a richer, and fuller residential environment than other alternatives. In the early stages of their development, new communities are dependent upon existing governmental entities (Kelly, 1975). Those levels of dependency and

impact problems which may arise have not been studied in great detail, but it is known that supportive relationships often do not continue (Gulf-Reston, Inc., 1973). Plans for facilities such as sewers, zoning, roads, schools, and parks have failed and caused problems regarding the survival of the new communities (Kelly, 1975). Expectations of impact area residents are sometimes not met and this can result in severe social and economic problems for the residents, community, county, and state (Kelly, 1975; and Zehner, 1974). In the case of one new community, Reston, Virginia, social and economic problems still exist after more than 20 years (Kelly, 1975).

Because people in the new town would be almost totally dependent on IPP, any serious reduction in the project's work force would add to the economic burden of the county. The county would have to assume responsibility for sewer and water systems, law enforcement, etc. Even if the new town is developed with financial bonding, the county or the state would still be responsibile for providing services.

Reston, Virginia (which is one of the largest planned communities in the United States in a comparatively populous area) ". . . has become the victim of its own impact. Various court decisions... have made... and complicated... its impacts" (Kelly, 1975). The Reston developers may drop the project before completion. This is not to imply that at this time, there is not a favorable balance of revenue to costs in Reston.

Careful planning and timely development of the new town and its associated facilities would overcome a potential boom town situation. The new town site would provide temporary trailer pads for construction workers as well as permanent housing for operational people. The growth would have to be controlled so facilities would be available upon demand as the new population arrived. If the facilities are available and are of high enough quality that the new-comers would accept them, the new town would grow and the county would not endure as much stress during construction and plant operation.

Of the wide variety of services that would be needed at the new town, some would be needed sooner than others. Construction of schools and parks would be a critical need within a few years after construction begins. Medical facilities in the region may take care of the new demands for a few years, but the project would eventually create a demand for new hospital facilities and medical personnel. The existing law enforcement systems in the region would not be adequately staffed and salaries would be far below those in Salt Lake City. A high turnover rate in law enforcement personnel would result during construction.

(b) Impacts Without New Town

Existing municipal facilities are grossly inadequate to meet the needs of either a construction-peak population or a permanent population. Major investments would be required in both new facilities and improvement or replacement of old ones. Any quantitative estimation of cost and revenue would be highly speculative (UPC, 1978).

Three basic problems have arisen in similar cases elsewhere: (1) insufficient government revenues during project construction when service demands are most intense, (2) largely unanticipated problems which surface long after the development is underway as people begin to realize the personal and social ramifications of profound economic change, (3) additional problems that cannot be treated merely by expenditure of funds, but remain as costs of development to be borne by community residents (UPC, 1978).

The county would have to provide a number of permanent public facilities to meet the rapid growth without the new town. The following is a list of the estimated physical needs.

1. A water treatment plant delivering at least 2.24 MGD, and a distribution system.

2. A sewer treatment plant and sewer lines, capacity 0.94 MGD.

3. At least two new schools, one elementary and one new junior-senior high school or expand the present junior-senior high school.

4. At least two doctors, two dentists, seven to ten nurses, one small hospital.

5. A small police station, ten policemen, at least 5 police cars.

6. One fire station with three pumper trucks, two other vehicles about 15 to 20 volunteer firemen.

7. Sanitary land fill site, 1 bulldozer, 1 small office.

8. One municipal building with library.

9. One city park with recreation center, swimming pool, picnic tables, etc.

To meet service demands, when revenues received as a result of the growth are inadequate, communities often make across-the-board increases in service rates, user fees, and taxes, or decrease the quality and quantity of services offered, or both. If this were to occur with initiation of IPP, the situation would improve as revenues increase relative to public service costs. It would be difficult, however, to avoid discriminating against the long-term community resident who is directly exposed to increased costs (UPC, 1978).

Traditional methods of providing services are not well suited to meeting needs during the project-construction phase. This phase is relatively short, but intensely disruptive. The construction work force is continually changing and financing of services depends on a long-term stable population. If permanent facilities were built to serve the construction population, long-term residents would be required to pay for idle structures. Though permanent facilites would be desired by the community, use of temporary quarters would be unavoidable during the construction period. Lack of facilities would also force more intensive use of existing facilities, greater use of mobile facilities, and, overall, reduced service levels (UPC, 1978).

(2) Education

Present capacity of Wayne County schools is 240 elementary and 319 secondary students. Should IPP be built, space would be required for 300 elementary students in 1982, 1,401 in 1987, and 690 in 1990 and for 240 secondary students in 1982, 920 in 1987, and 529 in 1990. If permanent quarters were constructed for the 1990 student population, the difference between it and the

1987 peak could be met by using temporary facilities (or by sending students to school in shifts). For the elementary facilities, this would mean permanent additional space for 390 students and temporary space for 711 more. For secondary students, additional permanent space for 210 students would be needed and temporary space for 391 (UPC, 1978).

Assuming student-teacher ratios of 27 to 1 for elementary schools and 24 to 1 for secondary, the total teachers required by the Wayne County population in 1982 would be 21; in 1987, 91; and in 1990, 47. Current costs and space requirements average $53.00 per square foot for 76 square feet per student. Providing facilities for the temporary student would be the immediate problem. With proper planning, the required permanent facilities could be constructed. Facilities for the temporary students could be provided through use of existing non-school buildings in the community, use of school buildings in shifts, or purchase of portable 25-student units which are available for about $20,000.00 each. The cost for portable units would be $800.00 per student while permanent facilities would cost $4,028.00 per student (UPC, 1978).

(3) Housing

Since the permanent work force would be much smaller than the construction work force, new construction of single family homes would not be expected to exceed projected long run demands of the community when the project's operation and maintenance phase has been reached. The difference between the demand for single family homes at the population peak and the operation and maintenance phase would be met by mobile homes or group quarters for single workers (UPC, 1978).

At projected population levels, the demand for dwelling units is shown in Table 3-16.

TABLE 3-16

Wayne County Housing Requirements With IPP
In 1982, 1987, 1990

	1982	1987	1990
Total population[a]	2,700	10,800	5,000
Required Dwelling Units	816	3,186	1,521
Average Household Size	3.31	3.39	3.28

Source: UPED-SAFE Model Projections, Bureau of Economic and Business Research, University of Utah.

[a]Population as projected under Scenario II.

With a new town, assuming an average household size of 3.4 in 1987, 41 more housing units would be required in Bicknell in 1987 than in 1990, 54 in Loa, and 16 in Torrey (UPC, 1978).

(4) Local Government Financing

Local government would be confronted with rising service costs. Wayne County communities are remote and small and have no experience in capital

programming. Moreover, they have limited financial resources and would be under great time pressure (UPC, 1978).

The ability of local governments to engage in debt financing of capital projects through bonding is functionally dependent upon the size of the property tax base. Through formation of special districts as allowed under current Utah law, some flexibility to exceed strict constitutional limitations would be possible. Still, the front-end financing problem (insufficient funds to cover costs of service provision in the early years of project construction) would result from the unresponsive property tax system (UPC, 1978).

e. Quality of Life

The quality of life data and analysis were provided by Dr. Stanley Albrecht, 1978.

Unless proper control is maintained, socioeconomic problems similar to those experienced in other western locations, such as Gillette in Campbell County, Wyoming, would occur. Rapid population growth caused by development of energy resources has created a boom town at Gillette. Campbell County, when compared with two nearby counties, had divorce rates that were 33 to 85 percent higher; arrests were 67 to 204 percent higher; criminal budget was 51 to 62 percent higher; school dropouts were 26 to 56 percent higher; public drunkenness was 139 to 185 percent higher; and driving while under the influence of alchool was 350 percent higher (O'Hare and Sanderson, 1977).

Industrial development would contribute to urbanization. Although the need to avoid urban degradation is particularly critical in southcentral Utah, there is a lack of ideas and methodologies for dealing with adverse effects of urbanization.

IPP would bring economic benefits to some people in Wayne County. However, the economic benefits would not be shared equally. Construction workers and businessmen would have the most to gain while ranchers and farmers would have the least. The exception to the latter would be the appreciation in value of land close to the development.

Development of the proposed new town would add a new element to the existing sociological scene and would alter the cultural life of nearby residents. This town would be unique because it may very well provide a large block of voters that could control local and regional destinies. Since the population of new town would be three times greater than the present population, there would be a shift in the balance of power from the western to the eastern portion of the county. The new town could become the focus of voting power within Wayne County. Furthermore, because of potential differences in political orientations, it is legally possible that the new town could become the county seat of Wayne County, if not of its own newly created county. Newly elected representatives may take actions and involve themselves in political issues which are not directly oriented toward the interests of the present native local community.

An in-migration of construction workers and their families would bring a different set of values into the area. Past experience has demonstrated that homogenity would be reduced. Construction workers have a lifestyle and behavior patterns that would conflict with those held by a majority of the present residents.

There would be a change from what is now basically a rural, religiously, culturally, and ethnically homogeneous population to one that is more highly skilled, less agriculturally oriented, and certainly more heterogeneous in terms of its religious, cultural, and ethnic background. Small subcommunities

based on ethnic and racial lines could conceivable develop in the overall area. Occupational and professional groups would subdivide as urbanization occurs and clashes would develop because of differences in cosmopolitan and local social ties.

There could be tension between residents who attempt to maintain established and traditional patterns and people who have different interests. Disruptions would occur to the extent that outsiders would participate in special interest groups, in opposition to traditional life styles.

For the residents of the new town, one would anticipate at least a temporary high level of social disorganization and anomie. An initial community organization and structure would have to emerge. However, the rate of growth would be so high that the community would have a difficult time responding to the demands for services and amenities that would come from the new population. Studies of western energy boom towns have noted with great frequency that newcomers often do not identify with their new communities and are unconcerned with making them quality places to live. This is particularly true when they know their stay is a temporary one. Therefore, the lack of community cohesion, identity, and committment is likely to lead to social disorganization.

Rural communities are generally known for their friendliness, close personal relationships, and low level of problem behavior. These characteristics are representative of Wayne County. Fifty-five Wayne County residents were interviewed concerning the project (Albrecht, 1978). The perceived impacts of IPP on this rural way of life are negative. Eighty percent of the respondents felt that crime, delinquency and drug usage would increase. Fifty-three percent felt that the local environment, water, land and air quality would deteriorate if IPP were constructed. Thirty-three percent perceived that the friendliness of the area would decrease. In this case, the 61 percent majority felt that IPP would have no impact on the friendliness of the communities.

When asked to evaluate the anticipated changes in the rural life style, 42 percent of the respondents felt that the quality of the rural way of life would become worse; 38 percent anticipated that it would improve. The remaining 21 percent expected that the benefits and costs cancelled each other, leaving the overall quality of life unchanged. Thus it appears that there was a feeling that the rural way of life would probably deteriorate somewhat if IPP were to be constructed.

When the respondents were asked to make an overall assessment of the anticipated impacts of IPP on goods and services, 96 percent believed that IPP would result in improvement. Feelings were that increased population would strain local services at first, but that current services would be expanded and additional services and businesses would be attracted to the area in the long run.

Sixty percent of the respondents anticipated improvement in local schools in the study area. They also thought that doctors, dentists, and other professionals would come to the area.

The respondents were asked to indicate their perceptions of IPP's impact on employment and economic opportunities. Ninty-six percent felt that employment and economic opportunities would be enhanced. A majority of the respondents also identified economic opportunities, as being an advantage associated with the proposed power plant. Several respondents replied that if IPP were built, young people would be able to find employment and would not have to migrate out of the area.

To ascertain anticipated effects on their own economic opportunities, the respondents were asked whether they felt that their own personal financial

situation would change if IPP were constructed. About half, 45 percent, replied that their financial situation would be better or much better. Forty-nine percent replied that the power plant construction would not affect their personal financial situation and only 6 percent felt that IPP would have a negative impact on their finances.

In order to identify which groups were perceived to benefit most or least if IPP were constructed, respondents were asked to rank several categories of people in terms of the project impacts. Construction workers and businessmen were identified as the two groups who would profit the most. Next were local people who would obtain new jobs. Only two percent felt that local individuals who keep their same jobs would benefit most. None saw the primary benefits going to local farmers and ranchers. Farmers, ranchers and other local residents who stay in their current jobs were identified as the groups least likely to profit.

The survey results indicate that the respondents perceive their basic beliefs and values as different from those held by construction workers and their families who would be attracted to the county. The people anticipated that new values would threaten traditional values and that conflict would likely occur between the long-time residents and newcomers. A considerable proportion of the community felt that this conflict would be at least moderately serious.

When the people were asked to weigh the social costs of the plant against the benefits, 26 percent indicated that they were "unconditionally in favor" of IPP. An additional 50 percent reported that they were "generally in favor although they have some reservation." Two percent replied that they were "absolutely neutral." Thirteen percent reported that they were "generally opposed" while only 6 percent indicated that they were "unconditionally opposed" to the proposal.

When questioned on anticipated changes in political structure, respondents indicated that, they anticipated little permanent political change would occur if the construction workers and their families moved into existing communities. Temporary construction workers tend not to become involved in local politics except in special cases which directly affect their lives. Some respondents, about four out of fifty, did express a fear that construction workers would impose their values upon certain aspects of the political structure.

The respondents were asked several questions to determine how they perceived the construction of a how new town would change the local area. Responses ranged from very favorable to very unfavorable. A total of 58 percent of the sample expressed positive attitudes toward the construction of the new town. Of the remaining 42 percent, an equal number expressed neutral and unfavorable attitudes.

When asked to identify advantages that would be associated with the construction of a new town, the respondents mentioned several different factors. For example, a number of respondents noted construction workers would be located nearer to their jobs and long commuting distances would be eliminated. The new town was also perceived as a deterrent to the "boom-town" effects, and negative social impacts to the county. Newcomers in the new town could take care of their own housing, community government and water problems. The services that could be provided in a new community of the size that is projected were also seen as advantageous for the entire county, particularly such services as improved medical care, increased shopping opportunities, and so on. The primary interest of respondents was the social and infrastructure problems that would be associated with the project. As one respondent ex-

pressed: "Most of these people would move out after construction, so let them live in their own community."

Wayne County residents felt that certain disadvantages would be associated with the construction of a new town. For example, several noted that there would probably be a water pollution problem in the new town. Providing public services to the community was seen as a serious problem due to lack of funds and expertise. The type of people that would be attracted was also a concern with several respondents expressing the fear that crime rates would increase and that the local life style would change. Some respondents expressed the concern that their taxes would have to go up to pay for the new schools, police services. One respondent expressed the view of many with the following summary comment: "This town would be built during construction--trailers, trash, and transients--then left for the county people to clean up and put back."

Several respondents expressed the fear that political power would shift from the west to the east end of the county. In response to an open-ended question concerning the political impact to the county, a number of respondents volunteered that an almost immediate change would be a political power shift from old residents "up-county" to new residents "down-county." As a consequence, newcomers would have the ability to control local elections to affect the future direction of the county.

2. Coal Source Area

The coal for IPP would be taken from the following three categories of mines:

1) Mines for which an environmental statment has been prepared and filed with EPA.

2) Presently operating mines for which no environmental statement will be required.

3) Mines for which an environmental statment is or may be required inorder to satisfy short-term leasing criteria.

The impacts from IPP mining are basically assessed in the Central Utah Regional Coal Environmental Statement Development of Coal Sources in Central Utah (USGS, 1978). IPP related coal miners would definitely increase populations in Carbon and Emery counties. The miners of the Central Utah Coal Region presently produce about 8.8 million tons of coal annually and IPP's annual average consumption of coal would be about 8.12 million tons. The population projections which were used in the regional environmental statement have become a matter of discussion between the State of Utah, Office of the State Planning Coordinator on the one hand and the Southeastern Utah Association of Governments and the Community and Natural Resources Planning Office of the Six County Commissioners Organization on the other.

The State Planning Coordinator's Office supervised the preparation of the population projections and they have said the following (see Letter Number 1 in Chapter 9 for complete comment):

> . . . The Commissioners' Organization has asserted that the state's Central Region population projections are inadequate

> because (1) they fail to reflect the level of coal production already attained in the Emery-Sevier County area, and (2) the projections rest on assumptions concerning the commuting of miners between areas of residence and work-places that do not reflect the current (and therefore future) situation. In addition to stating our position concerning these points, I want to clarify the difference between a projection and a prediction as I think it has a material bearing on the Commissioners' line of criticism. I conclude that in the absence of reliable information not considered in the Central Regional Socio-economic analysis showing the contrary, the population projections presented in the draft environmental statement are adequate.
>
> Population projections are conditional statements of the consequences of assumptions, they are not predictions. They do not tell the user what the future will be, only what might happen if certain specified things occur.
>
> The population projections in the Environmental Statement on the Development of coal resources in Central Utah are based on specified, assumed levels of coal production in the Region during the period 1975 to 1990. If coal mining does not occur as stated in these assumptions, there is no guarantee that population projections will describe evolving Regional conditions very well. The importance of the assumptions, and of formulating them adequately, is clear. . .
>
> . . .The fact that current actual coal output in C-4 exceeds that assumed may be reason for re-examining the assumptions. Whether it is or not depends on expected future conditions in the industry. Will coal mining in C-4 exceed that assumed by 1990? If not, and if the assumption is a plausible representation of unfolding future conditions, then the population projections may be an adequate statement of the consequences of expanding area coal production. A market study for C-4 coal (not undertaken as part of the environmental analysis) would be required to descredit the assumptions employed in the environmental statement. The uncertainty of the future and the lack of a market study both underscore the importance of examining a range of coal output and associated socio-economic consequences.
>
> The impacts of coal mining analyzed in the environmental statement (including the population projections) are differences that would arise should an assumed path of coal development occur that is different from a projected area baseline condition. The adequacy of the projections of population is a matter of how well they describe the changes in population resulting from differing levels of coal production; adequacy does not turn on how well the future *per se* is predicted. . .

The Southeastern Utah Associations of Governments (SEUAOG) has said (see Letter Number 5 in Chapter 9 for complete comments):

> Preliminary data generated by IPP proponents in 1976-77 indicated that they anticipated the population impacts occuring from coal mining necessitated by the proposed project would be

> evenly split between Castle Valley (Carbon-Emery) and Sevier Valley (Sevier-Sanpete). For a variety of reasons . . . [SEUAOG believes] . . . that if the Salt Wash site were utilized, the distribution of impacts between Castle Valley and Sevier Valley should run approximately 65/35. That is 65 percent of all population impacts related to IPP (if the Salt Wash site is chosen) will be in the Carbon/Emery areas. Of course, if IPP shifts to Lynndyl the ratio could go as high as 75/25.
>
> The coal production levels shown in the C.U.C.E.I.S. [Environmental Statement Development of Coal Resources in Central Utah] seem a few years behind schedule. According to our [SEUAOG] calculations, this region should be producing the 24 mty [million tons per year] by 1987 and possibly 27 mty by 1990. This of course doesn't include other possible coal production from the proposed Pacific Gas & Electric mines, and Utah Power & Light coal associated with the proposed Wellington power plant.
>
> . . . As sub-contractors to the State of Utah for certain portions of the data presented in the C.U.C.E.I.S., it was our understanding that that document would serve as the main data base for site specific EIS's (such as your . . . [the] current effort on IPP) as well as the EIS to be written on the new federal coal leasing policies. . .
>
> . . . We [SEUAOG] feel that portions of the data presented in the C.U.C.E.I.S. are erronious and that some of the conclusions reached there-in are misleading . . .

The Community and Natural Resource Planning Office of the Six County Commissioners Organization (Six County CNRP) was under contract to the State to provide socio-economic data for the Central Coal ES. The Six County CNRP contends that the base population projections were too low for their district and that population allocations were incorrect. They contend that the error was due to the fact that some of the population projections have already been reached and that the statement was out of date before it was published (Data from the Six County CNRP can be found in Appendix III-6; the full comment may be found in Letter Number 6 in Chapter 9):

> Thus, the assumptions the location of mines and mining activities along with population magnitude and distribution are no longer valid, and the EIS does not represent an accurate description of the proposed or likely coal mining activities, especially in the Southern Wasatch Plateau. Therefore, the population projections for the towns in Sevier, Sanpete, and Emery Counties cannot be utilized for planning purposes.

The IPP coal demands would add at least 10,000 people to the total population of the Carbon and Emery County areas. This new population would be added to the presently rapidly growing population.

Energy-related population growth in the Carbon and Emery County areas during the past several years has already caused some important change in the quality of life. This has been particularly true in Emery County, where small rural communities have experienced as much as a 100 percent population increase

between 1972 and 1978. New income and employment opportunities have affected the economic well-being of many area residents. For example, median family income in Emery County has more than doubled since 1970.

One of the major consequences of rapid growth is increased pressure on local services and facilities. A time lag often exists between the demand for new or expanded services and the ability of the tax base to provide those services. Other problems are shortages of housing, inadequate sewer, water, and medical services for the expanding population.

Since good quality housing has not been available, unattractive trailer court settlements have been established and will continue to expand in the smaller communities. This type of settlement is often crowded, and lacks lawns and other amenities that contribute to a better quality of life. The housing market will be unable to keep up with coal development growth.

The additional coal miners that would be hired as a result of IPP would also have to compete in the rapidly growing boom environment. They would have to live in rather unattractive surroundings.

Gilmore and Duff (1974), in discussing the experiences of communities going through rapid population growth, have noted the following:

> In Sweetwater County, Wyoming, the ratio of population/-physicians is 3,300 to 1. In the State of Colorado, the ratio increased tenfold while the population went from 18,000 to 30,000 in three years. The increase generated a different type of caseload, i.e., much higher incidence of broken home problems, alcoholism, and "down-and-outs."

They further state that:

> In Gillette, Wyoming, . . . an earlier boom abruptly escalated high school dropout rates, as jobs and wages increased steeply. Massive, unplanned mobile home parks sprung up; sometimes squatter colonies of trailers lacking normal water and sanitation facilities proliferated. The 1973 Housing Inventory. . .indicated 72 percent of the county's nonurban housing stock is mobile homes.

In discussing these and related developments, Gilmore and Duff note that the demand for services increased much more rapidly than has the property tax base.

Cortese and Jones (1977) found in their analysis of western boom towns several factors which distinguish present day energy boom towns from other boom towns. Among these are:

1. Rapid population growth.

2. Many, perhaps hundreds of communities are simultaneously affected in the West.

3. These energy boom towns are not being created in the wilderness, but in relatively stable agricultural communities.

4. The opening of a large mine can affect several small communities.

Some of these factors were considered as problems when the people were asked about population growth.

As reflected in 1977 interviews with key informants and a 1978 attitudinal survey (Albrecht, et al., 1977 and 1978) a majority of residents of the coal source area feel positive toward the growth that has occurred in the past few years. They continue to support moderate population and economic growth in the future. Most respondents, however, objected to "boom" growth. The IPP related miners would contribute to the rapid growth, which could be considered boom growth by local residents.

Cortese and Jones found that rapid growth affected the social structure, and long-time residents noticed the changes. Generally, they said a boom brings more people to the community, many of whom have different lifestyles, values, and norms. As the population increases, organizations adapt, and new institutional arrangements are made. For example, schools are affected, and their costs exceed benefits. The end result is that the long-time resident feels a smaller part of the larger community. Castle Valley residents generally accept and favor this change (Albrecht, 1978).

Local residents generally feel favorable toward newcomers working on energy-related projects. Key informants observed that coal development has brought "new blood" into the area and has provided additional employment.

Major concerns of key informants were that the proposal would: increase crowding, crime, delinquency, personal problems, and pollution and competition for water, and necessary services. These local attitudes and perceptions are based on the informant's experience with growth over the last few years.

Varying levels of residents' satisfaction concerns were registered in the community surveys conducted by Albrecht in both 1977 and 1978. These concerns indicate possible adverse impacts on the life style of area residents that would result from IPP related mining. However, persons interviewed in 1978, did tend to feel that the problems created by the influx of outsiders have not been as bad as anticipated. Since the more recent study was limited to Carbon County, it did not measure the more visible conflict between newcomers and longtime Emery County residents.

Individuals and families living on fixed incomes would be unable to benefit from the higher wages that are associated with the energy industry. However, they have to pay the higher prices for the goods and services. On the other hand, they could also benefit from new facilities and services. The new facilities and services should also permit newer residents to be more satisfied with the area.

Not all area residents exhibit favorable attitudes toward newcomers. Several key informants noted that itinerant construction workers have caused many problems for the area communities, particularly in Emery County.

Crime rates, mental health caseloads, family problems, alcohol and drug abuse have all increased concurrent with recent population growth in the area. The magnitude of these problems would increase as the population grows as a result of energy development and would be more noticeable in the rural communities of Emery County. The additional population resulting from IPP related mining would contribute to these problems.

3. Power Transmission Systems

Most of the socioeconomic impacts along the transmission system route appear to be relatively small and of short-term duration. The number of workers living in a particular location would generally be less than 100 and no more than 20 people would work at any single tower site.

Most of the construction labor force would probably not be accompanied by their families, would live in privately owned campers and trailers, and would go home on the weekends. The majority of the money paid to the workers would therefore not be spent in the communities near the corridors.

Noticeable impact from the crews would probably occur in communities of 1,000 people or less which are more than 50 miles from a larger community. Impacts on services would probably be evident in these areas.

A direct beneficial effect would be increased tax revenue for the counties and municipalities through which the transmission lines would pass. In the more heavily urbanized areas such as San Bernardino and Clark counties, the additional revenue would be much less significant than in the more rural counties. Table 3-17 shows the estimated tax revenue for each county crossed by transmission lines.

The following was supplied by project proponents in order to fullfill the requirements of the California Environmental Quality Act:

4. Growth-Inducing Impacts

The growth-inducing impacts related to the development of the generating station and the transmission systems are addressed above. The growth-inducing impacts due to the use of electricity from the Project are discussed below.

The availability of electrical energy could remove an obstacle to a specific level of previously planned economic or population growth. This is because cities and counties during their planning for population and economic growth commonly assume that required municipal services such as police, fire protection, water, electricity, sewage, and garbage collection will be available. Thus, providing electricity could be considered one of the factors that results in growth-inducing impacts.

According to the California Energy Commission, it is also theoretically possible that additional electric power could cause additional economic and population growth (California Energy Commission - Southern California Edison Coal Gasification Demonstration Project Draft EIR, page 217). This could occur if the additional electric power provided increased reliability and/or cheaper energy to a service area. In the case of reliability, it is conceivable that, if electric service in an area were sufficiently unreliable to interfere with regular business or manufacturing activities, the affected industry would move its operation to an area of more reliable service. The Western Systems Coordinating Council stated that all areas within its region would appear to have adequate reserve margins for the period 1979-1983. However, the council also points out that there are numerous unpredictable factors which could create deficiencies during the period (Western Systems Coordinating Council "Coordinated Bulk Supply Program 1978-1988" - Department of Energy Docket R362, page 3B-1 to 3). Whether or not there would ever be a sufficient disparity in electric service reliability between any two given regions of the Western United States in the future that would induce business to leave one area for another is a matter of speculation.

TABLE 3-17

Estimated Annual Tax Revenue From Transmission Lines by County

State and County	Total Construction Value (thousands)	Assessed Valuation (thousands)	1978 Mill Rate	Estimated Revenue To County
Utah				
Wayne	$ 9,582	$2,306	55.41	$ 138
Emery	10,802	2,600	56.28	146
Sevier	8,439	2,031	52.10	106
Piute	14,003	3,370	52.45	177
Garfield	7,697	1,852	54.50	101
Iron	38,279	9,213	52.39	483
Washington	12,615	3,036	62.55	190
Nevada				
Lincoln	35,912	12,569	35.00	440
White Pine	3,542	1,238	--	45
Clark	33,668	11,788	38.70	456
Arizona				
Mojave	1,866	933	73.80	69
California				
San Bernardino	163,800	40,950	40.00	1,640

Source: Hillier, 1979.

Similarly, it is speculation to predict that electric rates in the Western United States, which are regulated by various commissions and local agencies, will have or not have enough disparity in those rates in the future which would induce business to shift locations.

Generally speaking, economic or population growth in residential, commercial and industrial sectors of a community could result in environmental effects in various areas such as air quality, water quality and traffic congestion. Possible resulting increases in population could further tax existing community service facilities such as police, fire protection and social services. Such growth could induce individual development projects with subsequent environmental effects.

M. HUMAN HEALTH AND SAFETY

Generating Complex and Coal Haul Railroad

Based on construction accident rates (UIC, 1979) and the average number of employees, the following numbers and types of accidents could be expected during the peak of construction (1987).

453 accidents
149 lost work-day accidents
0.73 fatalities

During the operating phase of the project, the following accidents could be expected each year according to applicable rates (UIC, 1979).

31 accidents
8 lost work-day accidents
0.128 fatalities.

Potential for traffic accidents would also increase. During the peak population year, 324 auto accidents and 3 traffic deaths could be expected. During the operation of the plant, 150 accidents and 1 fatality annually could be expected (UDOT, 1979). Operation of the trains would increase the ambient noise levels in the vicinity of the tracks. Predicted noise levels from operation of a diesel freight train operating between 30 and 50 mph are presented in Table 3-18, and probably represent the peak noise levels associated with the coal railroad.

Potential collisions with animals, vehicles, and heavy equipment accidents would be safety hazards associated with the railroad.

Power Transmission Systems

Potential health and safety hazards during construction of the power transmission systems would result mainly from the use of vehicles and equipment. Based on a peak year average of 984 employees and applying the construction accident rates (UIC, 1979), the following could be expected: 183 accidents; 60 "lost-work day" accidents; and 0.3 fatalities.

TABLE 3-18

Predicted Train Passage Noise Levels

Distance (ft)	Noise Level (dBA)
100	92
500	82
1,000	74
2,000	63
4,000	49

Source: Kryter, 1970.

Health and safety hazards from the transmission lines would probably be minimal because they would cross sparsely populated areas. Chemical oxidants, audible noise, electromagnetic and electrostatic induction, produced by the transmission lines would be below the levels generally considered hazardous to human health and safety (Hook, 1977).

Other potential hazards are aircraft collisions with the lines, damage and injury due to collapse of towers or falling conductors, and electrocution. The probability of these accidents are minimal, but exist and would remain for the life of the transmission lines.

CHAPTER 4

MITIGATING MEASURES NOT INCLUDED IN PROPOSED ACTION

CHAPTER 4
MITIGATING MEASURES NOT INCLUDED IN PROPOSED ACTION

A. INTRODUCTION

Company proposed design features and government agencies' standard requirements are discussed in Chapter 1. Mitigating measures unique to IPP's proposal are discussed in this chapter. Measures are included which are feasible, committed, and enforceable by government agencies and are required to be implemented because of existing laws, court decisions, or agency policy. No other mitigating measures were identified. The California Environmental Quality Act required the IPP proponents to implement the following measures on all lands, regardless of ownership.

B. MEASURES UNIQUE TO THIS ACTION AND REQUIRED OF THE APPLICANT BY FEDERAL AGENCIES

Authority for requiring mitigating actions is granted under the same authority as described in Chapter 1.

If the proposed project were approved, the applicant would be required to carry out the following on Bureau of Land Management (BLM), U.S. Forest Service (USFS), and Bureau of Reclamation (USBR) administered lands.

1. Blasting and surface disturbance would be prohibited within 500 feet of all live springs.

2. Until natural flow resumes, the applicant would replace all water which is lost at springs, wells, and seeps, as a result of diverting water out of the Fremont River and pumping water from the Navajo Sandstone. The plans and actions related to the replacement of water would be reviewed and approved by the appropriate federal official.

3. Prior to construction activity on the plant site, a botanist familiar with the proposed endangered cactus, *Sclerocactus wrightiae*, would survey the plant site and all individual plants would be protected from disturbance. Construction would not be permitted until the botanist determined that no individual plants of this proposed endangered species would be damaged by the construction or until transplanting could be accomplished.

4. Construction of transmission lines on federal lands would cease when designated by the appropriate federal official in critical deer winter range, desert bighorn sheep range, sage grouse concentration areas, and areas of desert tortoise concentrations during the following periods.

a. From December through April on critical deer winter and elk range along the Southern California Transmission System:

Segment	Mileposts of Segment	
Salt Wash to Jack Henry (see Figure 2-A)	19 to 25	East slope of Solomon Basin
	30 to 43	North of Fremont
	55 to 59	Parker Mountain
	65 to 67	Kingston Canyon
	69 to 91	Kingston to Dog Valley
	100 to 105	Parowan Valley Area
Jack Henry to Cedar Wash (see Figure 2-H)	46 to 63	Kanaraville to Leeds (46 to 60 Private)
Jack Henry to Lincoln substation (see Figure 2-C)	0 to 2	Parowan Valley Area
	78 to 86	Mahogany Mountain

Associated new access roads through these areas would be closed by waterbars or barriers where possible.

b. During the months of February through May on bighorn sheep range along the Southern California Transmission System:

Segments	Mileposts of Segments	
Eldorado to Victorville, Line 1 (see Figure 2-F)	12 to 17	McCullough Range
	40 to 45	Clark Mountain
	92 to 95	Keany Pass
Eldorado to Victorville, Line 2 (see Figures 2-H and 2-I)	27 to 33	McCullough Range
	109 to 112	Cady Mountains
	156 to 163	Sidewinder Mountain

c. From March through April on sage grouse concentration areas along the Southern California Transmission System:

Segments	Mileposts of Segments	
Salt Wash to Jack Henry Junction (see Figure 2-A)	25 to 30	Forsyth Valley, Utah
	91 to 102	Dog Valley, Utah (95 to 96 private)

d. From December through March in Bald Eagle winter concentration areas.

Segments	Mileposts of Segments
Salt Wash to Jack Henry Junction (see Figure 2-A)	55 to 65 and 68
Jack Henry to Lincoln Junction (see Figure 2-C)	0 to 30
Jack Henry to Cedar Wash (see Figure 2-H)	0 to 45

e. From March through October on areas of known desert tortoise concentrations along the Southern California Transmission System:

Segment	Mileposts of Segment	
Cedar Wash to Gypsum Junction (see Figure 2-I)	5 to 25	Beaver Dam Slope, Utah
Eldorado to Victorville (Line 1) (see Figure 2-F)	35 to 38	Ivanpah Valley, California
Eldorado to Victorville (Line 2) (see Figure 2-H)	30 to 55	Ivanpah Valley, California

f. From May through August in Bendire's thrasher and gilded flicker habitat along the Southern California California Transmssion System.

Segment	Mileposts of Segment
Eldorado to Victorville (Line 2) (see Figure 2-H)	55 to 65

g. From December through April on critical deer winter range along the Utah Transmission System:

Segment	Mileposts of Segment	
Lincoln Junction to Gonder (see Figure 2-M)	20 to 45	Mule Shoe Valley, Nevada

h. From March through April on sage grouse concentration areas along the Utah Transmission System:

Segment	Mileposts of Segment	
Lincoln Junction to Gonder (see Figure 2-M)	71 to 102	Steptoe Valley

i. From December through March on bald eagle winter concentration area:

Segment	Mileposts of Segment
Paragonah to Bald Hills	0 to 16

5. Following the advice of a qualified wildlife biologist as designated by the appropriate federal official, roads, railroads, towers, and other ground disturbing activities would be located a minimum of 200 yards from identified active dens, burrows, or nests to protect the species listed in Table 4-1.

TABLE 4-1

Location of Animal Life Species of Concern

Species	Segment[a]	Mileposts of Segment	Name of Area
<u>Power Transmission Lines</u>			
Southern California Transmission System:			
Utah Prairie Dog	Salt Wash to Jack Henry	30 to 53	Awapa Plateau
		60 to 65	Grass Valley
		105 to 106	Parowan Valley
	Jack Henry to Cedar Wash	0 to 46	Cedar Valley (0 to 36, 39 to 46 private)
	Jack Henry to Lincoln	0 to 35	Cedar Valley (0 to 2 private)
		50 to 60	Escalante Desert
	Paragonah to Bald Hills	0 to 16	(2 to 14 private)
Desert Tortoise	Cedar Wash to Gypsum	5 to 25	Beaver Dam Slope
	Eldorado to Victorville (Line 1)	35 to 38	Ivanpah Valley
	Eldorado to Victorville (Line 2)	30 to 55	Ivanpah
	Lincoln to Gypsum (Line 1)	100 to 126	Hidden Valley
Bendire's Thrasher and Gilded Flicker	Eldorado to Victorville (Line 2)	55 to 65	Cima Dome
Gila Monster	St. George to Cedar Wash	85 to 87	Sand Hollow
	All routes in Nevada, south of Delamar Valley		Southern Nevada (about 200 miles)
Black-footed Ferret	Utah Transmission System (Salt Wash to Emery)	30 to 63	
<u>Railroad</u>			
Black-footed Ferret	Plant site to Emery	0 to 35	

[a]See Figures 2-A through 2-M.

6. The natural wild trout fishery on UM Creek (milepost 34, Salt Wash to Jack Henry) would be protected by closing off all new access and by leaving a 25-foot vegetation buffer between the nearest tower pad and stream. Stream crossing points would be temporarily bridged to prevent siltation of UM Creek.

7. Use helicopters as designated by the appropriate federal official to erect towers and string conductors in areas where access across the terrain or management constraints preclude standard construction methods.

8. The applicant would prepare photographic simulations of areas in which facilities are proposed within foreground-middleground areas of high scenic quality or high sensitivity as designated by the appropriate federal official. Using the simulation as a guide, the applicant would design and locate structures to blend into the existing environment. Affected governmental agencies would evaluate and approve measures prior to construction.

9. Where designated by the appropriate federal official, steel structures on the Utah transmission system would be used, instead of wooden structures, to reduce the visual contrast. Steel structures would be needed between the plant site and Jack Henry Junction, Jack Henry Junction and the Lincoln substation, and Jack Henry Junction to St. George Substation near highways and special scenic areas.

10. The power line to the Elkhorn microwave site would be buried next to the existing access road.

11. Transmission lines would be maintained and repaired using the same techniques as were used in original construction.

C. MEASURES REQUIRED OF THE APPLICANT BY STATE AND LOCAL ENTITIES

1. The same mitigating measures could be required on state and local government lands as on federal land. Authority is granted to the State of Utah under the Utah Code Annotated (UCA) 1953, 65-2-1 and authority is granted in California under the California Environmental Quality Act.

2. The applicant would be required to replace all water lost from springs, wells, seeps, creeks, and streams which have been appropriated to federal agencies or other users. Authority is granted to the State of Utah under the UCA 1953, 65-2-1.

D. EVALUATION OF MITIGATING MEASURES

By prohibiting blasting within 500 feet of springs, alteration of ground water regimes would be avoided. By replacing all water flows, there would be no impacts to the water supply for livestock or wildlife numbers on 147,200 acres which are watered by the 24 springs and seeps, and four wells that could

dry up (measures B-2 and C-2). The project proponents, however, proposed to provide water at depleted springs by windmills when the project is terminated. The climate of central Wayne County has not proven reliable for running windmills on a year-long basis. It would most likely be necessary to provide a separate energy source to maintain water flow at these points after project termination.

A survey for the proposed endangered cactus Sclerocactus wrightiae would enable a botanist to locate individual plants within the plant site and to designate areas where construction activity would be prohibited. A botanist familiar with the species, present during construction, would attempt to ensure that no individual plants would be destroyed. Transplanting of the cactus is feasible and would prevent large scale destruction of the plant (measure B.3).

By avoiding critical deer, elk, and big horn habitat during critical periods, limiting access, and avoiding sage grouse concentration areas along the transmission system (measure B-4), no measureable impacts would occur to these species. The use of a qualified wildlife biologist who would direct placement of roads, railroads, towers, and other activities, would mitigate the impact to special non-game species (measure B-5) except on 57 miles of private land as shown on Table 4-1. The natural wild trout fishery on UM Creek would be protected by using the mitigating measures discussed under B-6. The California Environmental Quality Act aquires IPP to carry out the identified mitigating measures on all lands regardless of ownership.

Implementation of mitigating measures B-7, 8, 9, 10, and 11 would reduce visual contrast impacts from vegetative clearing, skylining, and highway crossings along all transmission lines.

CHAPTER 5

ADVERSE IMPACTS WHICH CANNOT BE AVOIDED SHOULD THE PROPOSAL BE IMPLEMENTED

CHAPTER 5
ADVERSE IMPACTS WHICH CANNOT BE AVOIDED SHOULD THE PROPOSAL BE IMPLEMENTED

INTRODUCTION

This chapter summarizes adverse impacts which would affect the human environment and which cannot be avoided should the proposal be implemented. The impacts mitigated by measures described in Chapter 4 have been removed from the total impacts described in Chapter 3.

AIR QUALITY

The discharge of pollutants into the atmosphere would be an unavoidable impact. According to Westinghouse (1977) IPP's emissions of sulfur dioxide, particulates and Nitrogen oxides would be:

Sulfur Dioxide (SO_2)

Residual SO_2 emission rates would be approximately 30 tons per day using average grade local coal, or 44 tons per day using worst grade local coal with the units operating at 100 percent capacity.

Particulates

Assuming 99.5 percent control, particulates released would amount to 4.3 tons daily using average grade local coal and 5.6 tons per day using worst grade local coal with the units operating at 100 percent capacity.

Nitrogen Oxide

Emission rates, at 85 percent load, would be about 214 tons per day using average grade coal (approximately 73,616 tons per year). Emissions using worst grade coal would be about 251 tons per day (about 86,344 tons per year).

Air Quality Standards

The emission and National Ambient Air Quality Standards would be met. Independent modeling groups calculated that the Class I SO_2 PSD increments would be exceeded in Capitol Reef National Park, Canyonlands, and Glen Canyon National Recreation Area, all in Utah. Short Term (3 hour and 24-hour) Class I Standards in Capitol Reef National Park would be exceeded 34 days each year according to the H. E. Cramer modeling results. These result exceed the 5 percent variance permitted by the Clean Air Act Amendments of 1977. State of Utah (1977) modeling result show the Class II annual and 24-hour SO_2 PSD increments, surrounding the primary plant site, would be exceeded.

Trace Elements

Coal contains small amounts of trace elements which would be released into the atmosphere during plant operation. Trace metals may eventually accumulate in some ecosystems near the plant site, but the amounts are unknown.

Visibility

Westinghouse (1977) calculations show:

> In Capitol Reef National Park, the visual range would be reduced from 87 miles to between 80 and 84 miles for 7 to 11 days each year. For the remainder of the time the reduction in visibility would be less than 3 miles out of 87 miles.
>
> The visual range of an observer standing in Capitol Reef National Park and looking eastwardly toward the IPP plant, would be reduced from 87 miles to between 75 and 83 miles. This reduction would occur about 6 months out of a year depending on the observers' location relative to the plume.
>
> The visual range within Canyonlands National Park would be reduced to about 83 miles instead of 87 miles about 7 to 11 days each year. For the remaining time the reduction in visibility would be less than 4 miles out of 87 miles.
>
> The visual range of an observer standing in Canyonlands National Park and looking westwardly toward the IPP plant at an object outside the park boundaries would be 75 to 83 miles instead of 87 miles during about 6 months of a year, depending upon observer location relative to the plume.
>
> The visual range, based on data from 1975 through 1976, is about 40 miles or less for about 20 percent of the time. Under these conditions, the plant could reduce the visibility to between 34 to 39 miles within the park boundaries and for an observer standing in one of the parks and looking toward an object outside the park boundaries.
>
> Under certain meteorological and plume observer orientation, an atmospheric discoloration from the plume would be observed.

The determination of the significance of the impacts to visibility in Class I areas would depend upon the regulations that are to be promulgated by EPA sometime after August 7, 1979 and the position of the Federal Land Manager charged with the direct responsibility for management of the affected Class I area as to the impact on air quality related values (including visibility). It is the present policy of the National Park Service to protect the scenic values of their Class I area from any visual impairment of human levels of perception which is adverse (memo from Director, NPS, to Mr. David Hawkins, EPA, April 5, 1978).

Construction Activities and Increased Population

A long-term increase in SO_2, particulates, and NO_2 from population increase in the plant area could be expected. The particulate and NO_2 concentrations due to these low-level urban emissions have been estimated, for other power projects, to exceed the concentrations resulting from power plant emission (EPA, 1977c).

TOPOGRAPHY, GEOLOGY, MINERAL RESOURCES, AND PALEONTOLOGY

Surface geology and topography within the primary project area would be modified by taking approximately 7.6 million cubic yards of borrow material from identified borrow sites (see Figure 1-6).

The proposed town construction may make future recovery of coal or other minerals difficult. It is not expected that the coal could be economically recovered even without the proposed project (Doelling, 1972). The amount and quality of other minerals is undetermined.

Impacts from additional people in the regional setting would result in partial destruction or total loss of paleontological information. This information has value for scientific and educational purposes. The amount of loss and significance cannot be accurately predicted. Subsurface paleontological values not initially discovered through field inventories, could be encountered during construction. Even if salvage of subsurface paleontological values is performed, an unknown amount of scientific evidence would be lost due to limited salvage techniques. Increased access along transmission lines could lead to increased rockhounding and a loss of information.

SOILS

As a result of increased population in the regional setting, an unquantifiable increase in ORV activity would occur northeast of Hanksville on soils susceptible to wind erosion. The ORV activity would disturb these soils and make them more subject to wind erosion for approximately 20 years after being disturbed.

Construction activities within the primary project area would remove vegetation, compact soils, and cause localized increased erosion on approximately 5,710 areas.

Erosion along the proposed power transmission line routes would increase as soil stabilizing vegetation would be removed or crushed and soils would be compacted by construction equipment. The potential for increased erosion would be greatest along approximately 500 miles of moderate to high or severe erosion hazard areas that would be affected by the transmission line systems (Figures 2-B to 2-M). Increased erosion would be localized on the disturbed areas and no impacts on other resources would be expected.

The disturbed areas in the cold desert and mountain areas of Utah and Nevada would likely revegetate and stabilize within 10 to 20 years and the hot desert of Utah, Nevada, and California would likely stabilize within 30 years (Vasek, et al., 1975).

One area of major concern would be between milepost 22 and 26 of the Salt Wash to Jack Henry Junction segment of the Southern California and Utah transmission systems (see Figure 2-B). Along this segment new access road would be required. Soils in the area are unstable and slumping would occur along the access roads and tower pads.

WATER RESOURCES

IPP would use 30,000 acre-feet of water from the Fremont River which represents about 2 percent of Utah's share of Colorado River water (Olds, 1979). Other uses of the water would be precluded for the life of the project. Withdrawal would increase the salinity of the Colorado River at Lee's Ferry by, at most, 0.6 milligrams per liter. This would be an increase of less than 1/10 on 1 percent.

Caine Springs and as many as 23 other springs and seeps could cease natural flow. In excess of 50 years beyond the life of the project would be required before groundwater in the area would return to present equilibrium. Degradation would occur in ground water quality in the vicinity of wells.

VEGETATION

About 5,710 acres of cold desert vegetation are expected to be disturbed and about 5,220 acres would remain occupied by project components within the primary project area.

Approximately 40 acres of riparian vegetation would be inundated by the diversion works. Diversion of the Fremont River would inhibit growth of phreatophytes downstream from the point of the diversion. The amount of impact on this riparian vegetation (approximately 200 acres) cannot be accurately predicted, but is expected to be slight. Pumping of water from the Navajo Formation could stop natural flow at as many as 24 springs and seeps which would result in the loss of riparian vegetation.

A possibly endangered plant, *Sclerocactus wrightiae*, could be reduced in numbers in the vicinity of the plant site. Essential habitat for possibly threatened and endangered flora within the influence zone could be damaged by increased recreational use (e.g., ORV). Some plants could be destroyed and some species (such as cactus) might be taken by collectors. It is not expected that any species would become extinct.

The unusual endemic composite (Sunflower family), *Parthenium alpinum*, in the vicinity of the railroad route could be reduced in number.

The Southern California Transmission System would cross approximately 79 miles of Joshua tree forests in the hot desert vegetation type as shown on Figure 2-B through 2-M. Approximately 320 acres of Joshua tree forest would be disturbed of which 14 would remain occupied.

Construction of the line could impact any candidate or proposed threatened or endangered plant which occurs along the routes. Any construction activity which requires modification of the soils surface will have some affect upon vegetation. The extent of the affects are for the most part unknown, but are expected to be transitory and not permanent. Individual plants of threatened or endangered species could be inadvertantly destroyed. Although there are many California plants on candidate and proposed lists of threatened and endangered flora, none are to occur directly in the proposed route and probably none of these would be impacted (Johnson, 1977).

ANIMAL LIFE

Terrestrial Wildlife

The additional people which the proposed project would bring to Wayne County, Utah would increase the hunting pressure on and harassment of the region's game and non-game species and could reduce animal life populations. The degree of decline cannot be accurately predicted.

The endangered Utah prairie dog on the Awapa Plateau, the bald eagle, and the pregrine falcon would be more susceptible to shooting and loss by displacement with an increase in hunting and other outdoor recreational activities in the region. Such incidental losses are not expected to adversely modify the critical habitat of these species. The impact on the populations of prairie dogs and eagles would not be severe enough to jeopardize their continued existence. However, because only five active peregrine eyries are known to

exist in Utah (John Gill, FWS), loss of even one peregrine could constitute jeopardy to the Utah peregrine population.

A total of about 5,710 acres of wildlife habitat would be disturbed within the primary project area of which about 5,220 acres would remain occupied for the life of the project. The loss of habitat would mainly affect small mammals, reptiles, and amphibians.

The proposed diversion works would occupy approximately 40 acres of riparian habitat currently utilized by quail, deer, and non-game species. This is about 20 percent of the riparian habitat on the Fremont River between the proposed diversion works and Hanksville. Twenty-nine miles of river bottom habitat from the proposed diversion works downstream to Hanksville could be adversely affected by the proposed removal of water. The number of miles of stream bed that would be totally dry between November and March is not known. Recharge from seeps and overflow from the diversion works would provide dispersed watering stations for wildlife along the river. The number of acres of habitat and number of pheasant, quail, deer, and non-game animals that would be affected is not known.

The proposed railroad would occupy 145 acres of potential black-footed ferret (endangered) habitat. The actual existence of this species in the affected area has not been confirmed. The continued existence of the species would not be jeopardized nor would its critical habitat be modified.

If the agricultural lands near Caineville were converted to a residential area, the majority of the pheasant and quail habitat in the Caineville area (434 acres) would be occupied. At present about 25 pheasants are estimated in the area (Dalton, 1977).

Drawdown from the proposed ground water system could stop natural flow at Caine Springs and as many as 23 other springs and seeps between the Waterpocket Fold and the Henry Mountains. This could destroy important habitat for wildlife. Even though IPP would be required to replace water at the springs for the life of the project, water sources for wildlife could be lost for over 50 years after cessation of pumping. Up to 147,200 acres of habitat serviced by the springs and seeps could be affected.

Overall the proposed power transmission systems would disturb about 6,170 acres of wildlife habitat of which 420 would remain occupied for the life of the project. Some animals would be killed by machinery or forced into new habitation where they would be more susceptible to predation or less successful in competing for basic biological requirements.

Towers along 47 miles of powerline that would be in sage grouse concentration areas would provide perching sites for raptors with grouse more susceptible to predation and populations could decline. Reduction in grouse populations would lower hunting success, but the magnitude of loss cannot be predicted.

Isolated ferruginous hawk nesting sites could be located in pinyon-juniper foothills along the proposed Jack Henry to Lincoln Junction and Lincoln to Gonder Segments. If construction activities occurred during the nesting season, March through May, nest abandonment and decrease in hawk production would likely occur for one year. Losses in ferruginous hawk production would be small because ferruginous hawks nest on isolated nests rather than in dense eyries.

Aquatic Wildlife

An increase in population would bring greater fishing pressure to the waters of the region. During the peak population year of construction (1987),

these water would have to supply an additional 87,400 fish in order for the IPP related fisherman to experience the1973 quality of fishing in Utah (Hudson and Thayn, 1977 and Bangerter, 1973). An additional 31,000 fish per year would be needed to provide the same quality of fishing for the projected long-term IPP population. Utah's fish hatcheries are currently producing at their capacity of 11 to 12 million fish per year (UDWR, 1979) and without supplement planting rainbow, brook, cutthroat, and lake trout populations could decline slightly. The average age and size of these fish would also decline.

The increased fishing pressure exerted on the Green River is expected to be slight. Some incidental losses of the endangered Colorado squawfish and humpback chub, the proposed endangered bonytail chub and the proposed threatened humpback sucker could occur as a result of increased fishing pressure. The increased population in the area, however, is not expected to jeopardize the continued existence of these species or adversely modify their critical habitats.

The construction and operation of the proposed power lines would have no effect upon the rare (State of Nevada classification) and endangered fish in the Muddy and Mojave Rivers (Selby, 1977).

CULTURAL RESOURCES

Vandalism to known cultural resources could result in loss of scientific, recreational, and educational values. Numerous sites which are listed in, or eligible for the National Register of Historic Places are located within the regional setting and along the power transmission route.

Wherever possible and feasible, cultural resources would be avoided by shifting construction and related activities. If this is not possible, the BLM would consult with the appropriate State Historic Preservation Office to determine the most satisfactory means of mitigating damage. Even with present salvage techniques, some scientific and educational information could inadvertently be lost.

RECREATION AND AESTHETICS

Additional recreational pressures would most often occur at sites presently being used at greater than 20 percent of their design capacity, increasing use to 40 percent or more at many of the sites, which would result in overcrowding and deterioration of the environment and facilities. Overcrowding and deterioration would be intensified at sites presently being used at greater than 40 percent capacity (see Table 2-12). This pressure would cause additional use of dispersed areas. Sanitary and garbage disposal problems would be expected. ORV use in the regional setting would increase. There would be increased demand for 31,000 fish.

Additional competition for available fish and game would lead to reduced hunter and fisherman success and could result in some dissatisfaction with the recreation experience.

Recreational facilities in towns in the region would become overcrowded. Additional municipal facilities including 7 to 13 acres of city parks, swim-

ming pools, tennis courts, and a 9-hole golf course would be needed to meet minimum standards (BOR, 1967).

The plant and its visible emissions would be obvious to travelers on some segments of Highway U-24 and to viewers from areas of Class A scenery on the Fishlake National Forest, Capitol Reef National Park, and the proposed Hondu Primitive Area. The coal haul railroad would be a visual intrusion on the proposed Hondu Primitive Area and the Interstate Highway 70 (I-70) corridor. Along I-70 the resulting high contrast would be visible to the passengers in 1,300 vehicles daily.

Atmospheric discoloration and reduction of visual range would degrade scenic value of high quality scenic areas in the regional setting.

The transmission system would make 36 major highway crossings and would parallel major highways (I-15 and U.S. 93) for 160 miles in Utah and Nevada. IPP transmission lines would be visible (medium to high contrast) to travelers in 15,145 vehicles daily. The line would parallel U.S. 93 for 45 miles and would create a "tunnel effect" in combination with the existing transmission line on the opposite side of U.S. 93. In Utah, the line would be visible (medium to high contrast) from seven communities. In Nevada, the line would be visible (low contrast) from Henderson. In California, the lines would be visible (medium contrast) to residents of the Apple Valley area.

The lines would be visible from portions of 25 recreation attractions or areas of high scenic quality. There would be a low increase in man-made contrast as viewed from 8 areas, medium increase as viewed from 7 areas and high increase as viewed from 10 areas. The lines would be visible (low to high contrast) from portions of two Forest Service (FES) RARE II areas, 29 BLM Wilderness Study Areas, 9 uninventoried BLM roadless units, and the BLM Proposed Hondu Primitive Area.

The presence of the Moroni microwave station would reduce high aesthetic values in the surrounding areas.

LAND USE

Up to 434 acres (37 percent) of the irrigated land east of Capitol Reef National Park in Wayne County could be subdivided into small non-agricultural developments. An additional 133 acres (less than 0.05 percent) of agricultural land in Emery County would be occupied by the proposed railroad. No adverse impacts on mining or other mineral resource extraction operations have been identified.

In the regional setting, two RARE II Final Environmental Statement Wilderness Recommendation areas, four National Park Service Wilderness proposals and BLM uninventoried roadless areas, including areas identified as having potential for special designation (listed in Table 2-14 and identified in Figure 2-25) may receive additional ORV and other visitor use, resulting in degradation of wilderness value.

Should the proposed Moroni microwave station be built, primitive values within a portion of the proposed Hondu Primitive Area would be lost.

LAND USE PLANS AND CONTROLS

The I-70 railroad crossing would conflict with visual resource management objectives recommended in the BLM San Rafael Resource Area MFP.

Proposed power line activities would be in conflict with current BLM management objectives in nine areas identified in Table 3-11.

The BLM planning system allows for consideration of new proposals. Alternatives are presented in this environmental statement which would avoid conflicts for some planning units and other plans would require revision in order for the conflicts to be resolved. Any revision would be made following agency regulations, procedures, and policies. For BLM (inasmuch as new planning regulations have not been finalized) a policy would be followed which would utilize the environmental statement process as a mechanism for considering planning recommendations and trade-offs. An approval of the proposal and/or alternatives analyzed in the environmental statement shall also be a decision to amend the plan (or plans if more than one is involved).

HUMAN RESOURCES

Regional Setting

Population

The proposed power plant would create 610 permanent jobs in Wayne County. During the construction phase about a six-fold increase in population would occur, bringing the Wayne County population to about 10,800 people in 1987. During the operational phase of the plant, the population would increase about three-fold up to approximately 5,000 people. This population increase would change economic dependence from government, trade, services and agriculture to construction, transportation, communication and utilities. A large movement of workers and their families into Wayne County would take place quickly. The cultural backgrounds of the migrants would contrast sharply with that of the area's current residents, a situation that could engender social conflict. Rising incomes would also spur competition for goods, services, and housing. This would aggravate the problems of those receiving low or fixed incomes, particularly the elderly.

Competition for labor would adversely affect local government because the wages paid project employees would be higher than are typical of the area. Rapid growth would create financial strain for local government. New town construction would greatly reduce impacts on existing communities during construction, but during operation the existing communities would have grown 25 percent.

In the absence of a new town, existing communities would be several times larger than otherwise expected. The peaking effect of a construction labor force, many times the size of the operations and maintenance phase labor force, could induce a boom-bust cycle of short duration. The construction phase would have an intensely disruptive effect on area communities, overwhelming existing facilities and public services.

The county would have to provide a number of permanent public facilities to meet the rapid growth without the new town. The following is a listing of the estimated physical needs.

1. A water treatment plant delivering at least 2.24 MGD, and a distribution system.

2. A sewer treatment plant and sewer lines, capacity 0.94 MGD.

3. At least two new schools, one elementary and one new Jr.-Sr. high school or expand the present Jr.-Sr. high school.

4. At least two doctors, two dentists, seven to ten nurses, one small hospital.

5. A small police station, ten policemen, and at least five police cars.

6. One fire station with three pumper trucks, two other vehicles, and about 15 to 20 volunteer firemen.

7. Sanitary land fill site, 1 bulldozer, 1 small office.

8. One municipal building with library.

9. One city park with recreation center, swimming pool, picnic tables, etc.

At peak construction 3,186 dwellings, and during operation 1,521 dwellings would be required.

A sample survey of Wayne County was made, and generally the residents favor construction of the power plant. The people realized their community would become larger, facilities and services would be stressed, but they are willing to accept changes. Political power could shift to the east end of the county.

Coal Source Area

The coal source, Carbon and Emery Counties, would see a population increase of at least 10,000 people--the population projections, however, have become a matter of disagreement between State and local government. Therefore, quantification of impacts under this section has not been attempted.

Unlike the population associated with the plant site, the coal related population would grow gradually to a stable level as the units are completed. The increased population would be added to an area already stressed by rapid population growth.

Income in the coal source impact area would increase but would not be evenly distributed among the population. People with low or fixed incomes would be relatively worse off as higher incomes produce higher prices.

Physical facilities for community services such as culinary water, sewer, schools, etc., which might already be strained would have additional pressure put on them. This situation could be aggravated by the fact that the coal mines do not add significantly to the local tax base.

A population increase of 10,000 would require approximately 3,000 dwelling units in an area already experiencing housing shortages.

Varying levels of resident's satisfaction were registered in the community surveys conducted by Albrecht and others in both 1975 and 1978. These concerns indicate possible adverse impacts on the life style of area residents resulting from increasing population.

Crime rates, alcohol and drug abuse problems, mental health caseloads, and family problems have all increased concurrent with recent population growth in the area. The additional population resulting from IPP related coal mining would add to these problems.

Power Transmission Systems

Communities of 5,000 or less people would notice crowded motels, restaurants and some local shortages as rural segments of the transmission lines were built.

HUMAN HEALTH AND SAFETY

Primary Project Area

The following numbers and types of accidents could be expected at the plant site (UIC, 1979):

	Construction (Peak Year)	Operation and Maintenance (Average Year)
Accidents	453	31
Lost Work Day Accidents	149	8
Fatalities	0.73	0.128

Potential for traffic accidents would also increase. During the peak population year (1987), 324 automobile accidents and 3 traffic deaths could be expected. During the operation of the plant, 150 accidents and 1 fatality per year could be expected.

Operation of the trains would increase the ambient noise levels in the vicinity of the tracks.

Potential collisions with animals and vehicles, and heavy equipment accidents would be safety hazards associated with the railroad.

Power Transmission Systems

Chemical oxidants, audible noise, electromagnetic and electrostatic induction, would be produced by the transmission line but would be below the levels generally considered hazardous to human health and safety.

Other potential hazards are aircraft collisions with the lines, damage and injury due to collapse of towers or falling conductors, and electrocution.

CHAPTER 6

THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

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THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN's ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

This chapter discusses the extent to which the proposed Intermountain Power Project at the Salt Wash site would involve short-term commitments of resources and long-term maintenance of productivity and environmental values. The chapter also identifies reduction of long-term opportunities which would result from short-term use.

"Short-term" is defined as the lifetime of the generating complex. "Long-term" is the period of time extending beyond the life of the project during which environmental impacts would continue. The applicant has indicated that the project would be amortized over a 35-year period following completion of the four units, but the plant could continue to operate for an undetermined extended period of time. It is not known at this time which project facilities, rights-of-way, or properties would have some beneficial use beyond the 35-year period. The commitment of resources would involve increased short-term human activities in Central Utah and along the proposed transmission routes. This, in turn, would create both short and long-term effects to environmental values.

Major future options forclosed by construction and operation of the project are:

1. The option of using the coal for some future need. The use of coal under present technology and the mining of coal under existing techniques could result in a reduction of potential long-term productivity. In the future, improved mining techniques could allow a greater rate of recovery than the projected 50 percent. Coal fired generating plants are relatively inefficient--only about 38 percent of their heat value is converted to electrical energy (university of Oklahoma, 1975). Mining, transportation, and transmission introduce other inefficiencies. The energy available analysis in Table 6-1 shows the projected efficiency of actual energy consumed to energy delivered. Future technology, developed during the life span of IPP could improve that efficiency.

   It should be noted that the indicated efficiencies could be even lower if energy expenditures for secondary factors were included (i.e., transportation of workers to and from the coal mine and power plant, energy supplying heat at the new town, maintenance of transmission lines, and efficiency of electrical use in the market area). The proposed IPP system would probably be no less efficient than other such coal-fired power projects. The commitment of 405,600 Btu represents 0.008 percent of the total known reserves in the North American continent (USDI 1976).

   The proposed project would consume or otherwise permanently forclose all other use of about 617,160,000 tons of coal, or about 4.4 percent of the total known coal reserves of the Central Utah region (USGS, 1979).

TABLE 6-1

IPP Energy Available Analysis

Item and Basis for Computation	Energy Billion of Btu/yr[a]
Total energy in ground	+405,600.0
Coal left in ground at 50 percent extraction	-202,800.0
Energy used in mining	-971.3
Energy used by mine conveyor	-50.3
Washing or cleaning	0
Energy used by overland conveyors to railhead	-45.3
Unit train transportation, 47 mile average	-630.6
Power plant energy inefficiencies	-113,100.0
Transmission line losses (IPP design estimates)	-4,354.0
Estimated Total Energy Lost	-321,900.0
Energy Delivered	+83,640.0
System Efficiency	20.6 percent

Note: One pound of coal contains 11,500 Btu/lb, on the average (from IPP design). It is estimated that mining would be 50 percent efficient--thus leaving one pound of coal in the ground for each pound removed.

[a]Source: Energy Alternatives: A Comparative Analysis, University of Oklahoma, 1975.

2. Depending on plans for, and success of, future project removal, the option of using the land surface occupied by project features would be impaired for other land uses for the long-term future. This would involve up to 4,607 acres of land, of which 7,370 would be in Wayne County, Utah.

Cumulative long-term effects of coal development for numerous uses, including IPP, are discussed in a separate environmental statement, Environmental Statement: Coal Development in Central Utah. That statement projects the mining of a total of 383,000,000 tons of coal, leaving another 383,000,000 tons of unrecoverable coal in the mines, and disturbance of up to 2,400 acres of land for mining and associated activities. Other long-term cumulative impacts identified (but not quantified) are subsidence and subsequent changes in water flows; loss of wildlife and wildlife habitat; damage to archaeological and paleontological values; and the effects of more people living in Central Utah (USGS, 1979).

The power plant operation at Salt Wash would use an estimated 30,000 acre-feet of water per year from the Fremont River and 20,000 acre-feet per year from the Navajo Sandstone aquifer.

During the short-term and beyond (in part), this water could not be used for other purposes, such as municipal, industrial, agricultural, fish, and wildlife uses. For example, an urban population of 150,000 people could be supported by 30,000 acre-feet of water, the amount which would be taken from the Fremont River (200 acre-feet per year per 1,000 people). That amount of water would also support about 7,500 acres of irrigated agricultural land. Assuming a production of 6 tons of alfalfa per acre and 800 pounds of alfalfa per cow per month, this would support 9,374 head of domestic cattle, as well as large numbers of wildlife. The 20,000 acre-feet of water from underground sources is not suitable for human consumption, but could be used to farm 5,000 acres. Using the same assumptions, this could support 6,250 cattle. It is probably not realistic to consider piping this water to a large community, but suitable lands for farming are found south of Hanksville, Utah (Fremont River Study, 1975).

The proposed water use by IPP would continue for the lifetime of the plant operation. It is anticipated also that some of this water would continue to be used after discontinuance of power production since part of the population likely would remain in the new town, and the proposed Red Desert Reservoir likely would remain. In the long-term, a portion of the water could be devoted to such uses as noted in the preceding paragraph, subject to agreements and approvals from water regulatory officials.

In the long-term, flow in the Fremont river below the diversion during November through March could be restored after the power plant ceases operation. More than 50 years could pass after IPP operation ceased, however, before the Navajo Sandstone aquifer would be recharged. As many as 24 springs and seeps could be affected during the recharge period (USGS, 1976).

Cultural and paleontological resources tend to gain value over time. Should the proposed action be implemented, the short-term accumulation and dissemination of data gathered from survey and salvage during site disturbance would provide an immediate short-term gain to the scientific knowledge of the region. Conversely, future advances in technology may mean that preservation of the area for future observations would produce a greater amount of information in the long-term. Uncontrolled loss of such values could also occur from an increased population and associated recreational activities which

would forever remove an unquantifiable percentage of values from future research potential.

The annual electric power generation and use in the Western United States is expected to increase from 409,463 to 652,901 billion kilowatt hours by 1986 (WSCC, 1977).

In the short-term, coal use by IPP would constitute partial recovery and utilization of a natural resource to assist the nation toward self-sufficiency in energy and help meet projected increased demands. Table 6-2 shows a direct comparison of the predicted relative shift in the electrical generation mix between 1977 and 1986 (WSCC, 1977).

The power production from IPP would constitute about 24 percent of the projected 1986 increased use of coal as an electric power source in the western United States. The short-term use of this coal resource would enable a portion of projected load growth to be served, while possibly helping to provide additional lead time for research and technological development which could lead to increased productivity of longer-term energy sources-for example, wind and solar energy.

The commitment and use of 17,600,000 tons of coal annually (8,800,000 mined, 8,800,000 left in place at 50 percent recovery) to produce 3,000 MW of electrical power would be the equivalent of approximately 35,233,000 barrels of crude oil annually or 370 billion standard cubic feet of gas. Such a commitment for short-term use of coal could help to provide both the short and long-term availability of oil and gas.

Accidents resulting from project construction and project operations are estimated to occur at the rate of three fatalities every four years and 453 accidents and 149 lost work day accidents per year, (UIC, 1979). This type of risk would be present during the short-term, or project construction and operation period. Potential for increased traffic accidents would be highest during the short-term then receding in the long-term as construction and operation workers moved from the area.

The present high quality of the atmosphere would be committed to a degree of degradation during the short-term when the plant is in operation. The air in the region influenced by the IPP plant would be a receptor for combustion products of coal (including varied amounts of sulfur dioxide (SO_2), nitrogen oxides (NOx), particulates, sulfates, nitrates, trace elements, radioactive elements, water vapor, etc.). The estimated quantities of atmospheric concentrations (see Chapter 3) from plant emissions would produce, in the short-term, an unquantifiable and perhaps undetectable impact on soils, plants, and animal systems.

Solid, liquid, and gaseous contaminants emitted to the air are ultimately removed by a number of processes, including deposition. The air residence times (amount of time pollutants remain in the atmosphere) of SO_2, nitrogen dioxide (NO_2), and particulates, however, generally vary from a few hours to a few days, dependent on meteorological conditions. Thus, duration of air quality degradation, including visual reduction in the area around the IPP plant, would coincide with stagnant meteorological conditions in that area during the life of the plant. The predicted concentrations of SO_2, as well as SO_2 plus NO_2, would be below levels that would affect human health.

Certain trace elements released to the ecosystem have potential for long-term effect on soils, plants, and animals. Many of these elements have pathways of accumulation through the ecosystem, however, their potential influence is not well defined. Bioaccumulation and biomagnification, as identified for mercury (Standiford, et al., 1973) could occur with other trace elements.

TABLE 6-2

Sources of Electric Energy Generation in the Western United States

Source	Percent of Total Generation 1977	1986
Coal	21	28
Gas	6	1
Oil	20	20
Nuclear	7	19
Hydro	45	30
Geothermal	1	1

Source: WSCC, 1977.

The release of small amounts of radioactive compounds to the atmosphere from coal combustion would cause only a small increase in radiation exposure of the general population. The accumulation of these compounds in the soil would be but a small addition to the existing radioactivity levels.

Some general concern has been expressed in recent years that electric fields and induced magnetic fields in the vicinity of high voltage transmission lines are physically dangerous and can have adverse physiological effects (Univ. of Okla., 1975). Long-term effects from IPP's transmission systems are unknown. The proposed IPP transmission lines would span open country, however, where people would not spend long periods of time in their proximity.

Vegetation on 6,240 acres would be temporarily disturbed by construction, but would be replaced by natural succession or artificial means to varied extent during the short term. The project would occupy about 5,650 acres which would not be revegetated during the life of the project. After eventual removal of the project, about 1,500 acres would revegetate naturally, but approximately 20 years would pass before revegetation is complete. Riparian vegetation connected with as many as 24 springs and seeps could be lost for as long as 50 years after project abandonment. Vegetation produced at the new town--lawns, trees, and shrubbery--could be more abundant than that removed for the entire project.

Additional people moving into the region would exert both long-term and short-term impacts on fish and wildlife. The increased population would be present for at lest the lifetime of the project. Additional hunting and fishing pressure, harassment, and poaching would continue for an indefinite period of time, undoubtedly beyond the 35-year lifetime of the project, and would have an adverse effect on some species. The new environment at the Red Desert Reservoir and New Town may prove a long-term benefit to some wildlife species and their numbers may increase as a result of the project.

Use of power poles as perches by raptors would increase and continue as long as poles were present.

The increased population resulting from IPP within the regional setting could create adverse short-term effects on recreational resources. The overuse and deterioration of developed recreational areas could also occur. Solitude and primitive conditions could be lost within some areas. The impacts of this use would be widely distributed throughout the regional setting, but concentrations could be expected near the new town, on the Henry Mountains, or other nearby mountains, and on the San Rafael Swell. Other values would be affected or foregone for as long as proposed transmission lines remain in the areas of special concern as listed below:

Area	Concern
Black Ridge to St. George	Aesthetics, wildlife habitat, open space
Mahogany Mountain	Wildlife, wild horses habitat, roadless area, open space
Arrow Canyon Range	Roadless area, wildlife habitat, open space
Sidewinder	Recreation, aesthetics, open space

The addition of structures, such as the generating complex facilities and transmission lines, and an increase in urbanization would change the landscape

character of the areas. These changes could be permanent and long-term as long as the facilities remain after power production at the Salt Wash site is discontinued.

If the facilities are dismantled, some scars caused by heavy equipment would remain for indefinite periods due to the exposure of subsoils incapable of supporting vegetation. Even if reclamaton were carried out, there would be landscape scars which would result in a long-term change of the landscape character.

The aesthetic values, as viewed by the public, would change, but such changes would not be permanent. The local populace would become accustomed to the change, but persons traveling through the area may realize the short-term loss of the quality of the present visual experience. Visual impacts, especially from the plume, would continue for the duration of power plant operation as a short-term visual impact. Even though transmission lines could be removed after the IPP power generation were discontinued, it is possible that the major transmission lines would not be dismantled, but would be used in conjunction with other power production sources.

Those people now living in Central Utah would be aware of marked changes in social and economic patterns. Social consequences would rapidly occur, extend to varying degrees throughout the short and the long-term, and involve changes in the present economic situation, local political influences, local educational system, religious mixture of the people, local governmental services, and community organizations and associations.

CHAPTER 7

ANY IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED

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ANY IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED

Many natural, human, man-made, and monetary resources would be irreversibly or irretrievably committed if IPP were built. Irreversible commitment is defined as incapable of being reversed; once initiated, action would continue. Actions committing future generations to continue a similar course may be considered irreversible. Irretrievable is defined as irrecoverable; not retrievable; once used, not replaceable.

Some resources, such as air quality and water, would be irretrievably affected during plant operation. Others, such as coal, would be consumptively used and could never be replaced. Some theoretically reversible commitments would, in practice, be irreversible; the commitment of land occupied by the generating station and Red Desert Reservoir would be such a commitment.

Table 7-1 is a list of irreversible and irretrievable commitments for IPP.

TABLE 7-1

Irreversible and Irretrievable Commitments for IPP

Resource	Reason for Commitment	Commitment Irreversible	Commitment Irretrievable
Air Quality	Degradation caused by emissions from generating station and work force.	no	project life
Topography and Geology	Alteration by removal of 7.6 million tons of borrow material	yes	yes
Minerals	Mined and unrecoverable coal: 617,160,000 tons.	yes	yes
	Consumptive use of 3,640,000 tons of lime.	yes	yes
	Diesel fuel for coal transport: 86,590,000 gallons.	yes	yes
	Gasoline for commuting to work: 1,900,000 gallons	yes	yes
	Fuel oil (#2 diesel) for generator startup: 147,000,000 gallons.	yes	yes
Paleontological Resources	Disturbance and loss of fossils by construction and vandalism.	yes	yes

TABLE 7-1 (continued)

Resource	Reason for Committment	Committment Irreversible	Committment Irretrievable
Water Resources	Commitment of Fremont River water to industrial use.	no	project life
	Increased salinity in the Colorado River.	no	project life
	Loss of natural flow at as many as 24 springs and seeps caused by pumping of ground water.	no	up to 50 years beyond project life
Vegetation	Clearing for construction.	no	until revegetated
	Inundation of riparian vegetation by reservoir and diversion pond.	yes	yes
	Occupancy by buildings, towers, etc.	yes	yes
	Loss of candidate, proposed or officially listed threatened or endangered plants.[a]	yes	yes
	Loss of riparian vegetation at up to 24 springs and seeps due to ground water pumping.	no	Up to 50 years beyond project life
Animal Life	Loss of wildlife and their reproductive potential through increased habitat loss, inadvertent kills, hunting, and harassment.	no	yes
	Loss of threatened or endangered animals.[a]	yes	yes
Cultural Resources	Disturbance of sites by construction or vandalism.	yes	yes
Recreation and Aesthetics	Increased use of recreational sites.	no	yes
	Contrast of railroad, transmission lines, and other structures.	no	Life of facilities and structures
	Contrast from clearing of vegetation for transmission line construction.	no	until revegetated
	Possible air quality degredation and reduction in visibility.	no	project life

TABLE 7-1 (concluded)

Resource	Reason for Committment	Committment Irreversible	Committment Irretrievable
Land Use	Occupancy of up to 567 acres of irrigated land.	no	yes
	Change in ownership from federal to private of 1,080 acres at new town site.	yes	yes
	Loss of primitive values in proposed Hondu Primitive Area.	no	Life of structures
Human Resources	Change in lifestyle.	yes	yes
	39,300 work-years labor for construction and operation of IPP.	no	yes
Human Health and Safety	More accidents from increased traffic and construction activities.	no	yes
Building materials	Consumptive use of: 380,000 cubic yards concrete 57,000 cubic yards of asphalt 7.6 million cubic yards sand, gravel, and fill 100 miles of pipe 31,062 tons conductor 33.9 million board feet of wood.	yes	yes

[a]No extinction of any species is expected.

CHAPTER 8

ALTERNATIVES

CHAPTER 8
ALTERNATIVES TO THE PROPOSAL

A. INTRODUCTION

This chapter deals with alternative design, engineering, linear facility routes, and authorizations for the Salt Wash site. Alternative sites, particularly the "Lynndyl site," are discussed in Volume II. Potential alternatives to the Intermountain Power Project itself can be found in Volume III.

Alternatives are defined as other ways, means, or locations which would achieve the objectives of the proposal. Where appropriate, the discussion of each alternative includes a brief description of the environment, identification and analysis of impacts, evaluation of mitigating measures, and identification of unavoidable adverse impacts.

The design features proposed by the applicant and government agency standard requirements presented in Chapter 1 would apply to alternatives described in this section.

In impact analysis, only impacts which would significantly affect the quality of the human environment are discussed. Resources that are not significantly affected are not included.

Alternative coal sources and coal mining techniques are considered in the Environmental Statement: Development of Coal Resources in Central Utah.

B. ALTERNATE PARTICULATE REMOVAL SYSTEMS

Most particulate removal systems are unable to remove 99.5 percent of the particulates in the stack gasses. Two methods which have demonstrated the efficient ability to remove particulates are electrostatic precipitators, as proposed for use by IPP, and baghouses. A comparison of removal efficiencies versus particulate size for various kinds of particulate removal systems is shown on Figure 8-1.

While highly efficient at a smaller scale, baghouses have not been evaluated for efficiency at a scale needed for IPP. Baghouses would result in impacts similar to those described in Chapter 3 for electrostatic precipitators.

C. ALTERNATE COOLING SYSTEMS

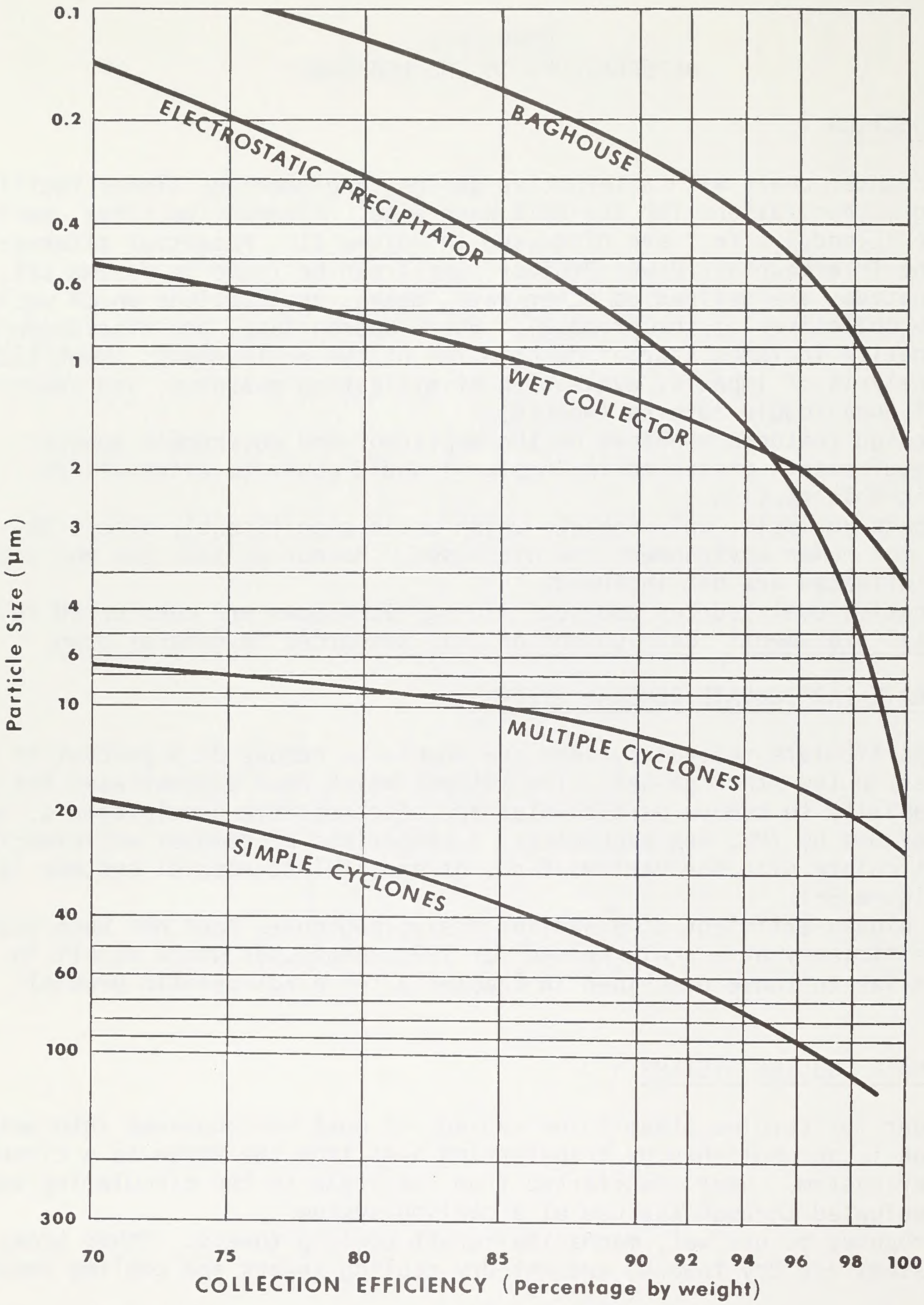
In order for turbine steam to be reused, it must be condensed into water. Condensation is accomplished by transferring heat from the steam to a circulating water system. Heat transferred from the steam to the circulating water is then dissipated through the use of a cooling system.

IPP proposes to use wet, mechanical-draft cooling towers. Other types of cooling systems are dry towers, and wet-dry cooling towers and cooling ponds.

1. Dry Cooling Towers

Dry cooling towers use air to dissipate heat from the power plant to the surrounding atmosphere. The cooling is accomplished by drawing air past tubes and fins containing the heated water. Water consumption by a dry cooling system would be essentially zero. Cooling tower drift and plume would be eliminated.

Turbine cycle efficiency using dry cooling towers is estimated to be 4 to 10 percent poorer than a conventionally-cooled turbine cycle. Thus, a plant having a dry cooling tower would require up to 10 percent more fuel (an additional 800,000 tons of coal annually for IPP).



Source: EPA

SIZE EFFICIENCY CURVES FOR PARTICULATE CONTROL EQUIPMENT

FIGURE 8-1

For a dry cooling tower application, the turbine must be capable of operating at higher peak pressures, approximately 10 to 14 inches of mercury absolute, and at a much wider variation of back pressures. Suitable turbine generators are not currently in production in the United States.

The Office of Energy Research has established a program to determine the feasibility of dry and wet-dry cooling tower applications in the United States. Results from the program will not be available until 1982.

2. Wet-Dry Cooling Towers

This type of tower is merely a combination of a wet type tower and a dry type tower. This combination allows for advantages of both types--evaporative cooling efficiency during warm weather and conservation of water in cool weather. The use of wet-dry cooling towers could reduce evaporative loss of water by as much as 60 percent or 20,040 acre-feet per year over the proposed type of cooling tower (USDI, 1977).

3. Cooling Ponds

Cooling ponds use the natural heat exchange processes of evaporation, radiation, and conduction-convection to dissipate the waste-heat load from a power plant.

Ponds do not produce "drift" (droplets of mist) as do wet cooling towers, and avoid the environmental effects of drift on soil and vegetation. Also, until water quality becomes poor (estimated to be 20 years after the start of operation), the edges of cooling ponds would be excellent habitat for small animals and the ponds would provide temporary stop-over points for migrating waterfowl.

A major disadvantage of cooling ponds is that a large amount of land would be required.

D. ALTERNATE ASH AND SCRUBBER WASTE DISPOSAL SITE

The alternative disposal area would be located about 1 mile northeast of the proposed site as shown on Figure 8-2 and would include about 600 acres of public land administered by the Bureau of Land Management and 40 acres of Utah State land. The site would be fenced.

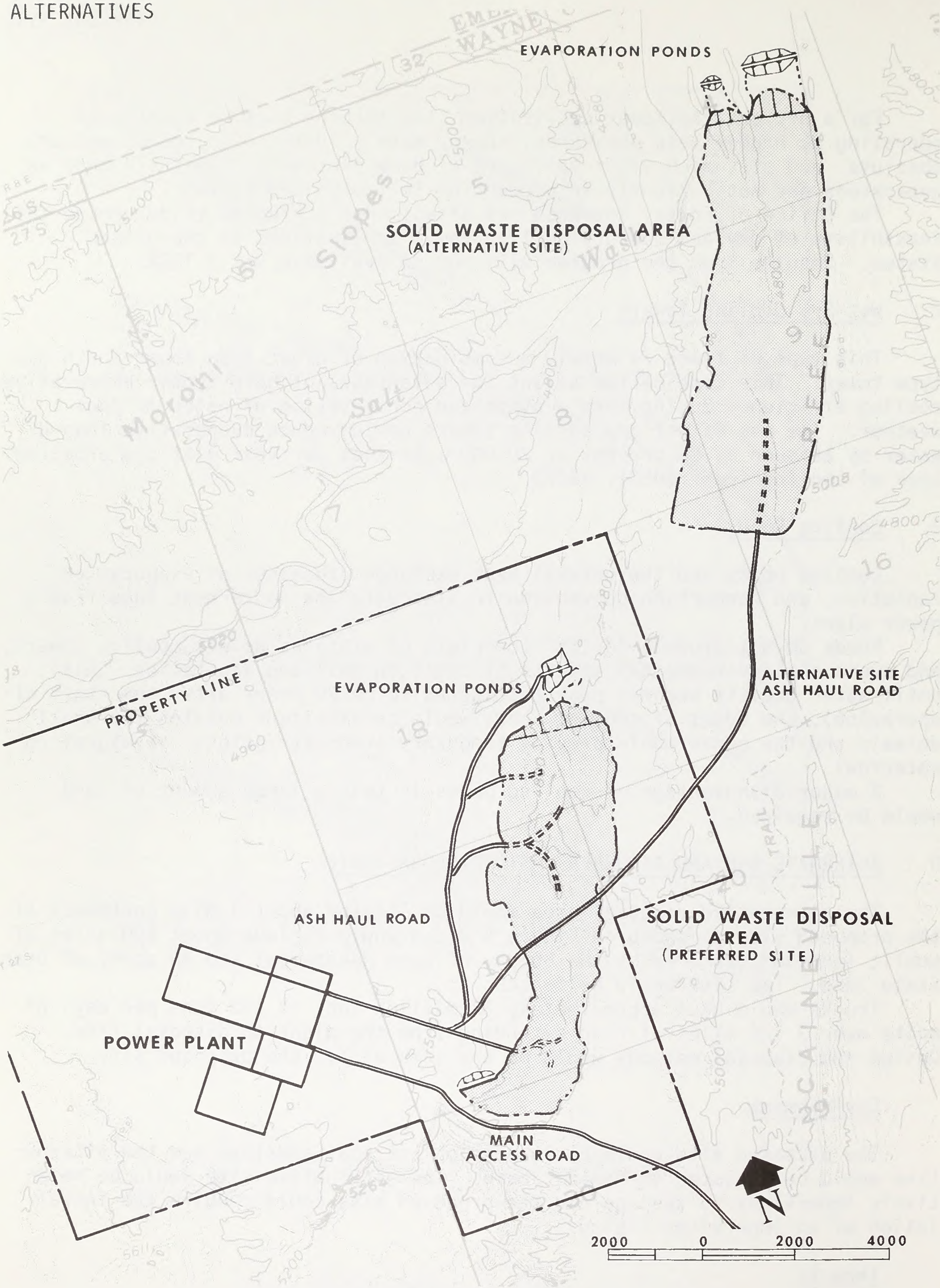
Trucks would haul approximately 53 million tons (4,100 tons per day) of waste over 3 1/4 miles of road extending from the plant to disposal site. Design and disposal methods would be the same as for the proposed site.

Environment

The proposed site would be located on Entrada Sandstone and the alternative would be situated on Mancos Shale. The alternative site would be relatively impervious to seepage and the proposed site could require the installation of an impervious lining.

Impacts

Impacts would be similar to those resulting from the proposed waste disposal site. The alternative site would have the advantage of a natural impervious lining.



SOLID WASTE DISPOSAL ALTERNATE SITE

FIGURE 8-2

E. CAINEVILLE WASH BORROW SITE

An alternative borrow site for sand and pea size gravel (alternative to site B, see Figure 1-6) is approximately 5 miles southwest of the generating station, near Willow Seep, as shown on Figure 8-3. About 510,000 cubic yards of processed sand and gravel could be obtained from this site. If material were removed to an average depth of 10 feet, about 50 acres of this 440 acre site would be disturbed. The Caineville Wash alternative borrow site, within the primary project area, would be on public land administered by BLM. The existing environment and impacts of the alternative site would be essentially as described in Chapters 2 and 3 for the proposed site.

Adverse impacts which could not be avoided would be alteration of topography and geology. Subsurface cultural or paleontological values not detected in surveys could be lost by the removal of borrow material.

F. ALTERNATE COAL TRANSPORTATION METHODS

1. Coal Slurry Pipeline

Under certain conditions, a slurry pipeline could transport coal. At present, a 270 mile slurry pipeline is successfully being used to transport approximately 5.5 million tons of coal per year from the Black Mesa Coal Mine to the Mohave power plant.

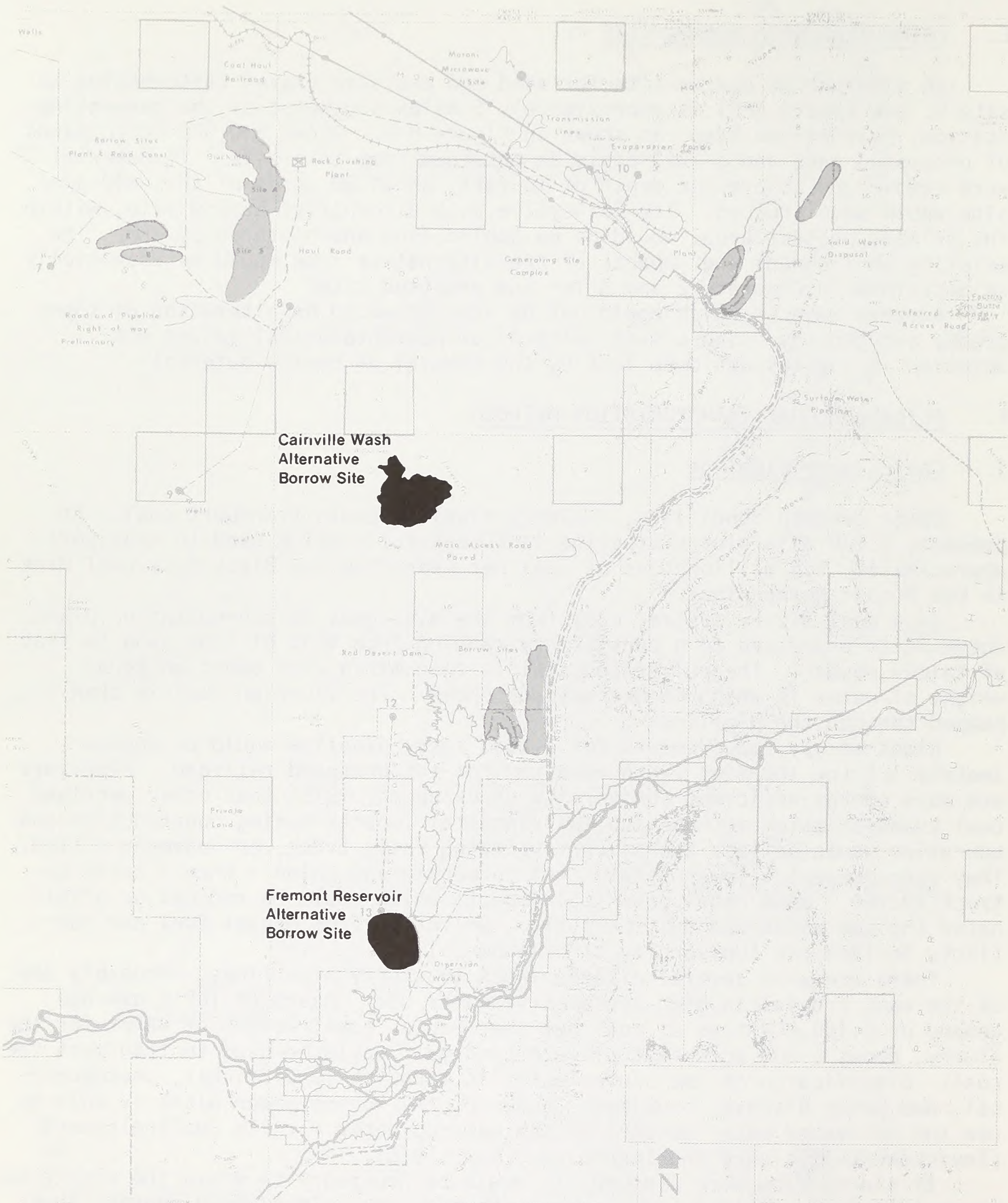
In a coal slurry system, coal from the mine goes to a preparation plant where it is processed to a consistency ranging from that of fine sand to that of talcum powder. The pulverized coal is then mixed with about an equal weight of water in which it becomes suspended. The slurried coal is then pumped through the pipeline.

Right-of-way requirements for a coal surry pipeline would be approximately 1/2 the 100-foot width required for the proposed railroad. Pipelines are more energy-efficient (University of Oklahoma, 1975) than other overland coal transportation methods and environmental impacts during construction and operation would be less than a corresponding rail, truck, or conveyor system. They also present a lower safety risk to people and animals than a train or truck system. Some other potential impacts which could be reduced or eliminated include noise and dust pollution, pollution from diesel fuel and conflicts in land use (University of Oklahoma, 1975).

There are also several disadvantages to slurry pipe lines. Probably one of the most crucial is high consumptive water use. Based on IPP's average demand of 8,120,000 tons of coal per year and an equal weight of water for the slurry, about 6,000 acre-feet of water per year would be used to transport the coal. Clarificaton of the slurry water is technically difficult, uneconomical, and poses disposal problems. However, the Mohave power plant is able to use the recovered water as part of the make-up water for its cooling towers (Environmental Science and Technology, Nov. 1976).

If slurry flow were stopped, it would be necessary to drain the slurry to prevent it from settling and clogging the pipeline. This would require that settling ponds be built to contain the drained slurry. These would have the potential problems of water contamination, land commitment, and disposal and containment of the finely crushed coal (Northwest Colorado Coal, 1976).

Large quantities of contaminated water could be released into the environment, if a slurry pipeline were to break. The damage could be minimized if pumping were promptly halted and the slurry in the pipeline were diverted into settling ponds (Northwest Colorado Coal, 1976).



ALTERNATIVE BORROW SITES

FIGURE 8-3

If a looped system (one in which the slurry water is recycled) were used, a larger right-of-way would be required and more land would be disturbed, but there would also be some advantages. The major advantages would be: the system would require less water; it would not be necessary to grind the coal as finely; and the problems of fines removal and slurry water disposal would be substantially reduced.

2. Conveyor Transport of Coal

Conveyors are an established method of moving material and are widely used in the coal industry. They are capable of handling large tonnages and are adaptable to difficult terrain. However, coal conveyors are more often used for short distances, averaging 5 miles, and in conjunction with other modes of transportation (University of Oklahoma, 1975). Although it is technically feasible to build large volume, long distance conveyors, the reliability of such a system has not been proven.

Conveyors are usually powered by electric motors which would eliminate the use of diesel fuel by the railroad. Potential traffic and collision problems would also be eliminated by a conveyor system.

The relatively high maintenance required by conveyors limits their desirability for large scale projects and would make it impractical to put such a system underground. An above-ground system might cause greater linear visual intrusion on the landscape than a corresponding rail or truck transport system.

3. Truck Transportation of Coal

Another possible alternative to the proposed coal haul railroad is the use of trucks to transport coal directly from the mines to the plant site. If existing roads were used, a round trip would be about 290 miles. If a new road were built from I-70 to the generating complex, the round trip would be shortened to about 100 miles. Trucks are assumed to carry 25 net tons per load (Hook, 1976) and average about 8 miles per gallon of diesel fuel.

Advantages of using trucks instead of the coal haul railroad are flexibility of use and the fact that existing routes could be used for a portion of the haul route.

There are several disadvantages associated with using trucks. Based on an average coal demand of 8,120,000 tons per year, trucks would burn approximately 4,060,000 gallons of diesel fuel annually for the 100 mile round trip and 11,774,000 gallons for the 290 mile route. Based on the same average demand, the proposed train would burn about 2,474,000 gallons per year.

Traffic along the route used by the trucks would be greatly increased. Based on the data above, there would be a loaded truck passing a given point along the route approximately every 1 1/2 minutes, 24 hours per day, every day. This would affect traffic patterns and increase safety risks on the road used. The roads would have to be designed, built, or rebuilt to handle the extremely heavy use.

Increased air pollution and noise impacts would also result from the use of trucks to transport the coal. These could not be totally eliminated.

While transport of the required amount of coal by truck is theoretically possible, its actual application would probably have greater environmental impacts than the proposed rail system.

G. ALTERNATE TRANSPORTATION ROUTES

1. Coal Haul Railroad Routes

Two alternative coal haul railroad routes are proposed by the applicant. They are segments which deviate from portions of the proposed route. One alternative, the Walker Flat Loop, would reach a coal loading station in the vicinity of the junction of Highway U-10 and Interstate Highway 70 (I-70) as shown on Figure 8-4. A second alternative, Oil Well Bench, would replace the rugged Last Chance Wash portion of the proposed route (see Figure 8-4).

The alternatives and the segments they would replace are compared on Table 8-1 and 2. The environmental elements of the alternative segments are shown on Figure 8-5 (Figure 2-A shows the environmental elements of the proposed route).

a. Walker Flat Loop Alternative

(1) Description

The Walker Flat Loop alternative would be 12.5 miles long and would replace a 7.7 mile segment of the proposed route (see mileposts 24 to 31.7, Figure 2A).

(2) Existing Environment

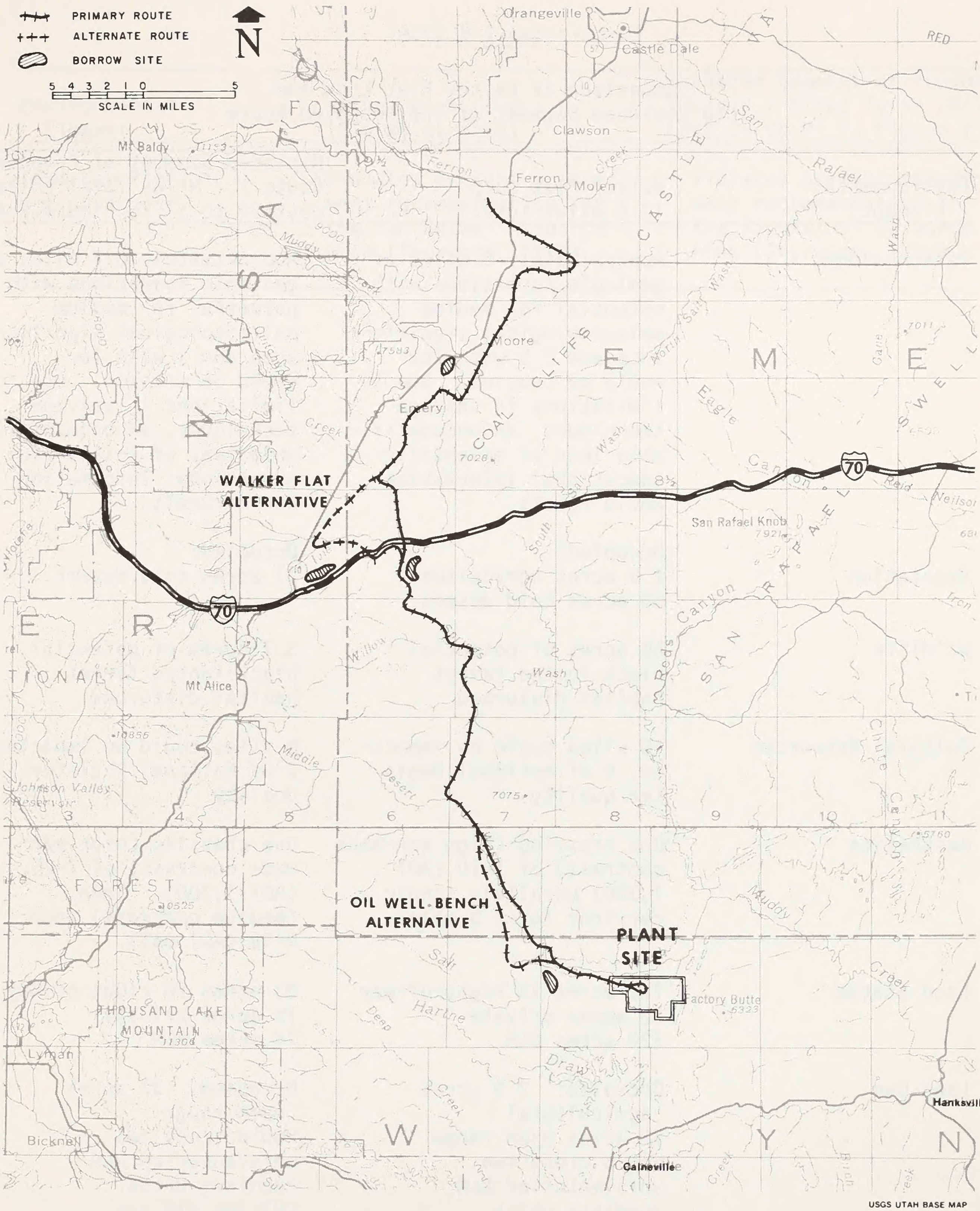
This alternate would cross intermittent or ephermal streams, about 0.5 mile of agricultural land, and 12 miles of cold desert vegetation. The agricultural and cold desert vegetation provide habitat for white-tailed prairie dogs and the endangered black-footed ferret could be associated with prairie dog towns. The presence of the black-footed ferret in the area has not been confirmed. The endangered peregrine falcon and bald eagle have been sighted in the vicinity of this alternative route. Livestock grazing is an established use. Approximately 9 miles of geologic formations with potential for medium paleontological significance would be crossed between mileposts 4 to 9. About 9 miles south of Emery, Utah, the alternative route would pass through the eastern portion of Trough Hollow which is an area of numerous archaeological sites.

This alternative would cross I-70 and parallel it in a scenic corridor for approximately 2.5 miles.

The alternative would cross two uninventoried BLM roadless units (UT-060-010 and UT-060-013) between milepost 10-15.

(3) Environmental Impacts

Approximately 2.5 acres of agricultural land and 58 acres of cold desert vegetation would be occupied by the railroad bed and accompanying access road. The vegetation would be lost for the life of the project. No candidate, proposed, or listed threatened or endangered plant species known to occur along the alternate route. Approximately 60 acres of white-tailed prairie dog habitat would be disturbed and a reduction in prairie dog numbers would reduce the available prey for the black-footed ferret, should there be any in the area. No peregrine falcon or bald eagle nesting areas would be affected by this alternative route. At least 16 archaeological sites would be disturbed and their disturbance would result in a permanent loss of archaeological



COAL HAUL RAILROAD ALTERNATES

FIGURE 8-4

TABLE 8-1

Comparison of Walker Flat Loop and the Replaced Segment of the Proposed Route

Environmental Element	Walker Flat Loop 12.5 miles total	Replaced Segment of Proposed Route 7.7 Miles Total (Milepost 24 to 31.7, Figure 2-A)
Paleontology	Approximately 9 miles of geologic formations with potential for medium paleontological significance and 3.5 with low would be crossed. Due to limitations in salvage techniques, an unquantifiable loss of scientific-educational information would result.	Approximately 6.7 miles of geologic formations with potential for medium paleontological significance and 1 with low would be crossed. Due to limitations in salvage techniques, an unquantifiable loss of scientific-educational information would result.
Vegetation	Occupied: 2.5 acres agriculture 58 acres cold desert	Occupied: 37 acres cold desert
Wildlife	59 acres of potential black-footed ferret habitat disturbed	3.7 acres of potential black-footed ferret habitat disturbed
Cultural Resources	16 sites could be impacted, 6 of National Register quality	6 sites could be impacted, 2 of National Register quality
Aesthetics	One crossing (high man-made contrast) of I-70 (ADT 1,300) parallels scenic corridor for 2.5 miles.	One crossing (high man-made contrast) of I-70 (ADT 1,300). Seen (medium contrast) from U-10 (ADT 665).
Land Status	152 acres in right-of-way 32 acres private 120 acres BLM	93 acres in right-of-way 19 acres private 74 acres BLM
Land Use	Occupied: 2.5 acres agricultural 58 acres open range Would cross two uninventoried BLM roadless units (UT-060-013 and (UT-060-010) for 5 miles (milepost 10-15).	Occupied: 37 acres open range Would cross two uninventoried BLM roadless units (UT-060-013 and (UT-060-010) for 3 miles (milepost 27-30).

TABLE 8-1 (concluded)

Environmental Element	Walker Flat Loop 12.5 miles total	Replaced Segment of Proposed Route 7.7 Miles Total (Milepost 24 to 31.7, Figure 2-A)
Land Use Plans and Controls	Violates present management recommendation for the San Rafael Resource Area (Thurgood, 1977).	Violates present management recommendation for the San Rafael Resource Area (Thurgood, 1977)

TABLE 8-2

Comparison of Oil Well Bench Alternative
and the Replaced Segment of Proposed Route

Environmental Element	Oil Well Bench Alternative 17.3 Miles Total	Replaced Segment of Proposed Route 11 Miles Total (Mileposts 48-59, Figure 2-A)
Paleontology	Approximately 11 miles of geologic formations with potential for medium paleontological significance and 3.5 with low would be crossed. Due to limitations in salvage techniques, an unquantifiable loss of scientific-educational information would result.	Approximately 11 miles of geologic formations with potential for medium paleontological significance and 1 with low would be crossed. Due to limitations in salvage techniques, an unquantifiable loss of scientific-educational information would result.
Vegetation	Occupied: 84 acres of cold desert vegetation	Occupied: 53 acres cold desert vegetation
Cultural Resources	No known sites	Five sites could be impacted, none of National Register quality.
Aesthetics	The railroad would be visible (medium contrast) to visitor in the northeastern corner of Capitol Reef National Park.	The railroad would pass through 11 miles of high quality scenery.
Land Status	210 acres in right-of-way. 181 acres BLM 29 acres State	133 acres in right-of-way 121 acres BLM 12 acres State
Land Use	Occupied: 84 acres open range Would cross three uninventoried BLM roadless units (UT-060-009A, UT-060-009B, and UT-060-007) for 11 miles (milepost 0-11).	Occupied: 53 acres open range Would cross two uninventoried BLM roadless units (UT-060-007 and UT-060-009A) for 10 miles (milepost 48-58).

LEGEND

VEGETATION
- F- Forest
- MB- Mountain Brush
- PJ- Pinyon Juniper
- CD- Cold Desert Shrub
- HD-J Joshua Tree Forest
- C- Chaparral
- B- Barren
- R- Riparian
- UA- Urban Agriculture
- HD- Hot Desert Shrub

SOIL TYPE
- 1- Deep Alluvial Valley
- 2- Shallow, Shale-Clay
- 3- Shallow, Rocky
- 4- Desert
- 5- Mountain and Foothills

EROSION HAZARD
- 1- Slight-Moderate
- 2- Moderate-High
- 3- Severe

VISUAL FEATURES

SCENIC QUALITY
- A- High
- B- Medium
- C- Low

VISUAL ZONES
- F/M- Foreground/Middleground
- B- Background
- SS- Seldom Seen

SENSITIVITY
- H- High
- M- Medium
- L- Low

EXISTING MANMADE CONTRAST
- H- High
- M- Medium
- L- Low

LAND USE
- R- Open Range
- F- Forest
- U- Urban
- A- Agriculture
- B- Barren

PLANNING UNIT BY NAME

AREAS OF SPECIAL CONCERN (AOSC)
- U-LD-Urban Low Density
- Ag- Agriculture
- R-II- U.S. Forest Service Rare II Wilderness Recommendation
- WSA-BLM Wilderness Study Area
- RA- BLM Uninventoried Roadless Area
- Others- By Name

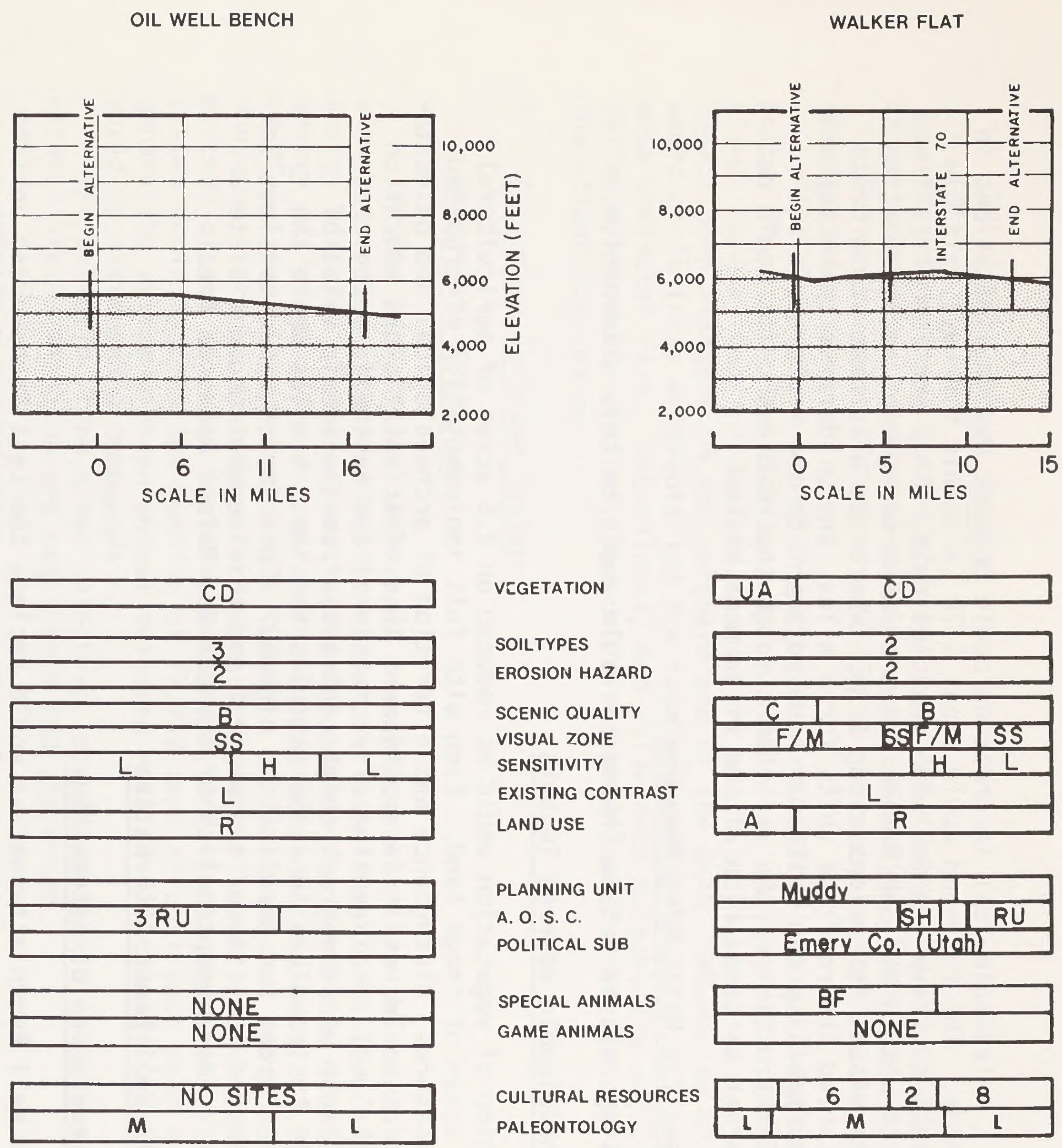
POLITICAL SUBDIVISIONS BY NAME

HABITAT OF SPECIAL ANIMAL LIFE
- UPD- Utah Prairie Dog
- DT- Desert Tortoise Concentration
- F- Threatened or Endangered Fish
- G- Gila Monster
- R- Raptor Concentration Area
- BF- Potential Black-footed Ferret
- BT- Bendire's Thrasher and Gilded Flicker
- WH- Wild Horses
- WB- Wild Burros
- U- Species
- WF- Water Fowl

IMPORTANT GAME HABITAT
- D- Critical Deer Range
- B- Desert Bighorn Sheep Range
- PB- Potential Desert Bighorn Sheep Range
- S- Sage Grouse Concentration Area
- P- Pheasant Habatat

CULTURAL RESOURCES: NUMBER OF SITES
- ( ) Eligible for National Register

PALEONTOLOGICAL RESOURCES
- H- Potentially High Paleontological Significance
- M- Potentially Medium Paleontological Significance
- L- Low Paleontological Significance



ENVIRONMENTAL PROFILE
COAL HAUL RAILROAD ALTERNATIVE

FIGURE 8-5

information. Paleontological information could be lost due to limitations in salvage methods. The railroad would cross I-70 (a scenic highway), visible (high contrast) to travelers in 1,300 vehicles daly. This section of railroad would conflict with a BLM San Rafael Resource Area management recommendation which opposes visual intrusions along I-70. Where the alternate would cross two uninventoried BLM roadless units for 5 miles, any wilderness character and wilderness suitability the units may have adjacent to the route would be impaired. Construction of the railroad through the roadless units would not be allowed prior to completion of the wilderness review.

(4) Specific Mitigating Measures

Mitigating measure B-5 in Chapter 4 would apply to this alternative.

(5) Unavoidable Adverse Impacts

Production of vegetation would be reduced on 2.5 acres of agricultural land and 58 acres of range land. Even with full implementation of proposed mitigating measures, disturbance and alteration of archaeological and paleontological remains would result in a permanent loss of scientific and education information as well as disruption of recreational and aesthetic resources.

The railroad would detract (high contrast) from the scenic value of Interstate-70 to travelers in 1,300 vehicles for the 2.5 miles where the railroad would cross and parallel the highway. This impact would continue for many years beyond the life of the project and this segment would violate a visual resource management policy of the BLM San Rafael Resource Area.

b. Oil Well Bench Alternative

(1) Description of Alternative

The Oil Well Bench alternative would replace the Last Chance Wash portion of the proposed route (see Figure 8-5). The alternative is 17.3 miles long and would replace an 11 mile segment of the primary alignment, (see mileposts 48 to 59, Figure 2-A). This alternative would eliminate construction within the Last Chance Canyon.

(2) Existing Environment

Geologic formations with potential for medium paleontological significance would be crossed. This alternative would cross Salvation Creek which is an intermittent stream. It would pass through 17.3 miles of cold desert vegetation in an area where no candidate, proposed, or listed threatened or endangered plant species are known to occur.

The endangered peregrine falcon and bald eagle are the only species found on the threatened or endangered animal list which could occur along this alternative route.

The railroad would be visible (medium contrast) from the northeastern boundary of Capitol Reef National Park.

This alternative would cross three uninventoried BLM roadless units as follows: (UT-060-009 A, UT-060,009b, UT-060-007) (milespots 0 to 11).

(3) Environmental Impacts

No specific mitigating measures have been identified for this alternative. Therefore, the adverse impacts described are unavoidable.

Paleontological information could be lost due to limitations of present salvage techniques.

This alternative would disturb 128 acres of cold desert vegetation and occupy 84 acres. The section passing within the foreground/middleground visual zone of Capitol Reef National Park would be visible (medium contrast) impact upon visitors to the northern end of the park. Where the alternative would cross three uninventoried BLM roadless units for 11 miles, any wilderness character (i.e., naturalness) and wilderness suitability adjacent to the railroad would be impaired, and could not be allowed prior to completion of the wilderness review.

2. Alternate Railroad System

Diesel vs. Electric

IPP has stated that they could possibly convert the proposed diesel-electric system into an electric system. Electric systems are 30-32 percent energy efficient, while diesel-electric systems are generally 23-26 percent energy efficient. The diesel-electric system would consume 2,474,000 gallons of diesel fuel per year and emit 834 tons of pollutants of which 485 tons would be nitrogen dioxide. For comparison, this is equivalent to about 0.6 percent of the NO_2 that would be emitted by IPP stacks, annually. The electric system would require the burning of 71,732 tons of coal each year in the generating system with an annual emission rate of 710 tons of which 611 tons would be nitrogenous compounds.

Air pollution from diesel-electric locomotives would have no adverse effects since emissions are negligible and dispersed.

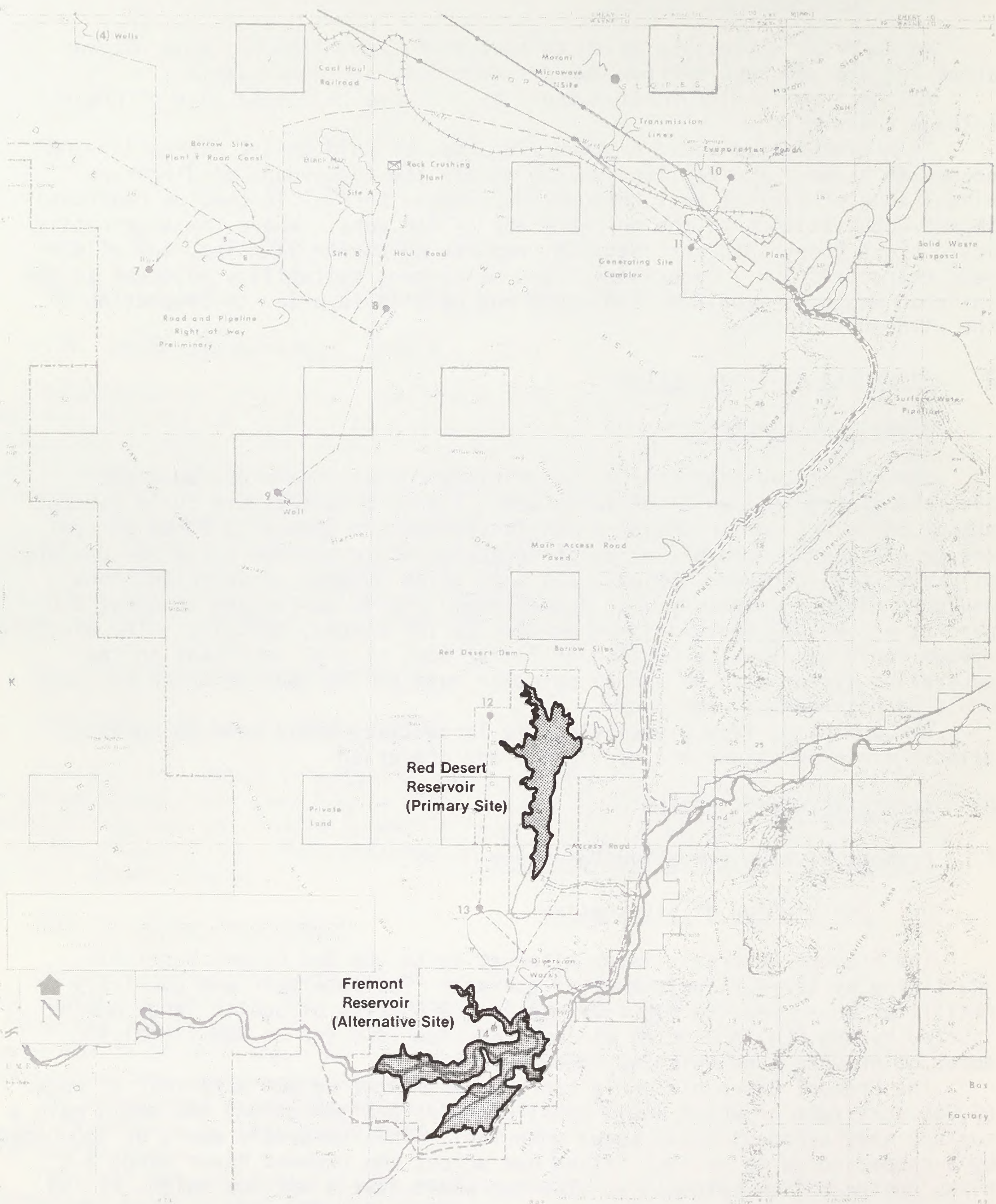
H. ALTERNATE WATER SOURCES

1. Fremont River Alternative Reservoir

a. Description of Alternative

The Fremont Reservoir is an alternative to the Red Desert Reservoir identified by IPP for surface water storage. The reservoir and ancillary facilities would require right-of-way to 2,960 acres of public lands administered by the BLM, 480 acres of State of Utah land and an additional 400 acres of private land which would be purchased.

The Fremont Reservoir would store a maximum of 50,000 acre-feet of water (5,000 acre-feet of which would be allowed for sedimentation) and would have a surface area of about 1,300 acres when full. This reservoir would be impounded by a compacted earth or rock filled dam across the Fremont River about 3.5 miles upstream from Caineville. The dam would have a maximum height of 159 feet above streambed, a crest length of 1,200 feet, and would be about 900 feet thick at the base. A pumping station would convey water through a pipe line to the power plant. An access road about a mile long would extend from Highway U-24 to the dam. This corridor would also accommodate a 69-kV power line for the pumps. Figure 8-6 shows the location of the Fremont Reservoir and dam.



ALTERNATIVE FREMONT RESERVOIR

FIGURE 8-6

If the Fremont Reservoir alternative were to be adopted, borrow material for the Fremont dam would come from the reservoir vicinity, rather than from sites identified for the Red Desert dam.

About 1,600,000 cubic yards of Summerville or upper Curtis Formation and 340,000 cubic yards of Salt Wash Sandstone, member of the Morrison Formation, would be obtained from the Fremont Dam alternative borrow site. In addition, about 630,000 cubic yards of Mancos Shale would be obtained from the reservoir vicinity to construct the impervious core of the dam. This borrow area would later be flooded by the reservoir.

The Fremont dam alternative borrow site would be within the primary project area described in Chapter 2. The site would require about 440 acres of public land administered by the BLM. About 75 acres of the area would be excavated to an average depth of 20 feet.

b. Description of the Environment

Riparian vegetation follows the meandering Fremont River through broken, Mancos Shale hills. The hills are sparsely covered with salt desert shrubs and grasses, and some slopes appear bare. The environmental setting provides habitat for low density populations of wildlife including chukar partridge, quail, nongame birds, rodents, coyote, mule deer, and resting areas for waterfowl. Dace and suckers inhabit the river.

Available information indicates that archaeological and historical values are low in this general area. A high potential for paleontological resources exists in the Mancos and Morrison formations from which borrow would be extracted.

Current land and resource uses are primarily allocated to domestic livestock grazing; mining of clay deposits; a transportation corridor (a segment of Utah Highway 24); and dirt roads.

c. Environmental Impacts

No specific mitigating measures have been identified for the Fremont Reservoir. Therefore, the adverse impacts described in this section are unavoidable.

Maximum water storage would inundate about 1,300 surface acres. Water would cover portions of a 4 mile segment of Utah Highway 24, a shallow ford on the Fremont River, and about 1 mile of connecting dirt road. About 75 acres would be disturbed for borrow material.

Topography and geology would be altered by removal of 2,003,000 cubic yards of borrow material. Potentially important paleontological resources could be lost in the Mancos and Morrison formations due to limitations in salvage techniques.

Impacts to water resources would be similar to those discussed for the Red Desert Reservoir in Chapter 3. Because some sediment would be deposited upstream from the Fremont River dam, the river below the dam would have increased capacity for carrying sediment. Increased streambank erosion downstream of the dam would result.

About 3.6 miles of riparian vegetation would be lost from the river banks, but the proposed reservoir could create more than 15 miles of habitat for riparian vegetation along its shoreline. The reservoir would provide a habitat for waterfowl.

The Fremont reservoir and dam, would be an intrusion on the natural scene, but could be visually pleasing to some observers.

The reservoir could attract recreationists and create litter and sanitation problems.

2. Alternate Ground Water Development

a. Description of Alternative

This alternative would withdraw 50,000 acre-feet of water annually from the proposed well field and eliminate the need for surface water storage. It is assumed ground water withdrawal would take place from the proposed field of 20 wells and additional wells would not be required.

b. Description of the Environment

The environment is the same as described in Chapter 2.

c. Environmental Impacts

Withdrawing 50,000 acre-feet per year for 35 years from the Navajo Sandstone would remove 12.5 percent of the ground water in the aquifer (USGS, 1977). Figure 8-7 shows the projected ground water elevation effect of withdrawing 50,000 acre-feet annually, the projected effect of pumping half that amount (25,000 acre-feet per year), and the present water surface. (A more complete comparision can be made by also refering to Figures 2-12 and 3-1). Some parts of the Navajo Sandstone would be completely dewatered. As the ground water quality is stratified, water quality would become worse with pumping.

The springs supplied by the Navajo Sandstone, and especially Caine Springs, would cease natural flow sooner than under the proposal. More springs and hence more riparian vegetation and wildlife habitat could be lost.

Certain high mineral content springs from the Navajo Sandstone may be supplying part of the base flow of the Dirty Devil River. The cessation of their flow could reduce the mineral content of the Dirty Devil and may, therefore, be beneficial to Colorado River water quality.

There would be no need for the Red Desert Reservoir and Fremont River Diversion works or Fremont Reservoir.

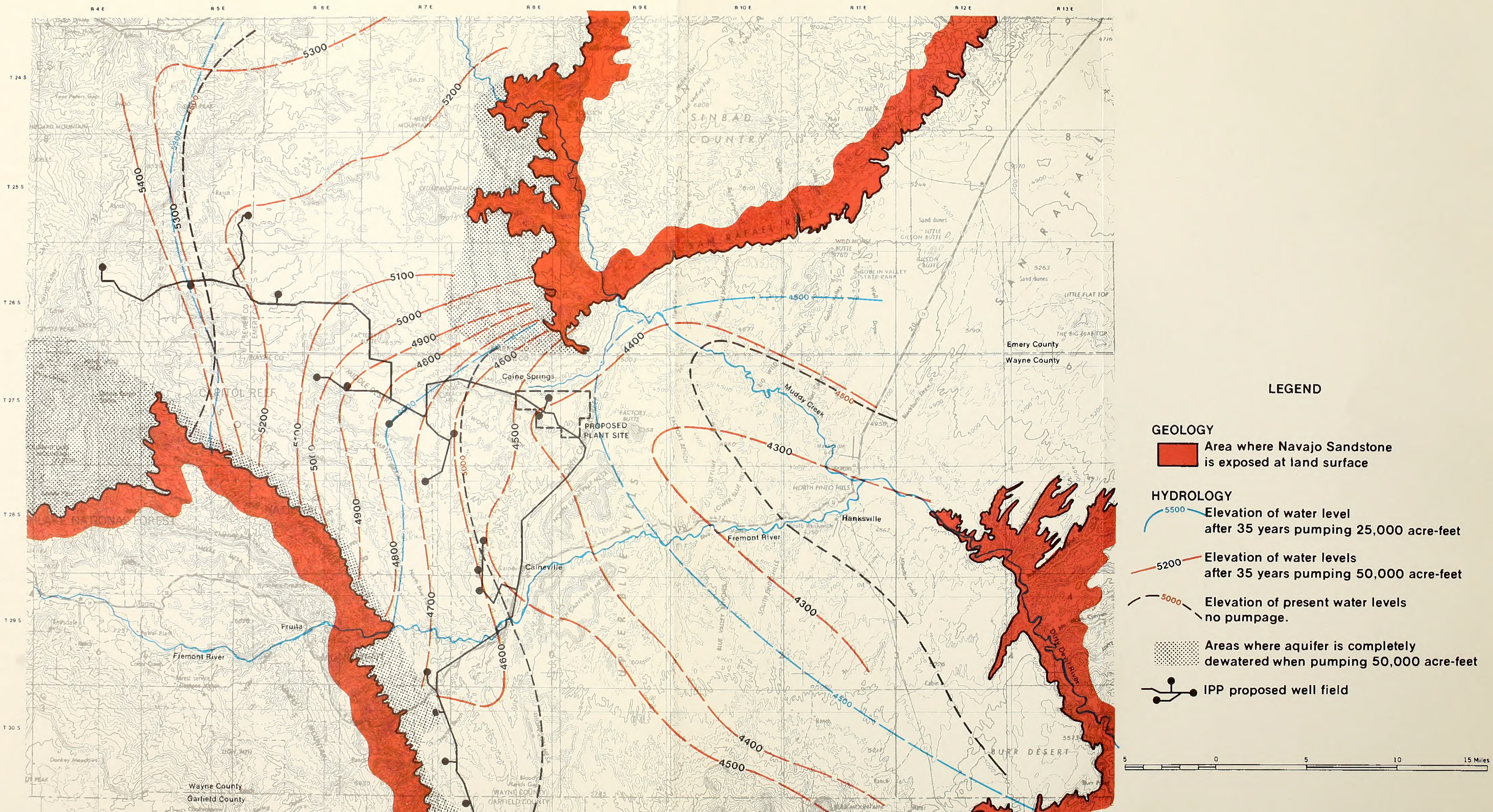
Beneficial impacts relating to surface water storage would be lost.

d. Mitigating Measures

Mitigating measure C-2, listed and evaluated in Chapter 4, would apply to this alternative.

e. Unavoidable Adverse Impacts

Approximately 12.5 percent of the ground water in the Navajo Sandstone would be "mined." As the ground water quality is stratified, the water which would remain would be of relatively poor quality. It is expected that natural flow at more than 24 springs would cease with a subsequent loss of riparian vegetation and wildlife. While IPP would be required to replace the flow of springs, seeps, and wells during the life of the project, an extended period of time would pass between the end of the project and beginning of natural flow. During this period, over 24 springs, seeps, and wells would remain dry.



GROUND WATER LEVELS: WITHDRAWL OF 50,000 ACRE-FEET ANNUALLY

FIGURE 8-7

I. ALTERNATE TRANSMISSION SYSTEMS

1. Routing

Ten alternative route segments are listed below. Alternatives "a" though "h" would be major realignments which could replace a portion of the proposed power transmission systems. Alternatives "i" and "j" would be minor realignments of the routes in order to avoid wilderness study areas. The alternative alignments are shown on Figure 8-8.

Map Letter	Alternate Route
a.	Geyser Peak
b.	Dog Valley-Fremont Canyon
c.	West Corridor
	(1) Jack Henry Junction to Bald Hills Junction
	(2) Bald Hills Junction to Beryl Substation
	(3) Beryl Substation to Paragonah
	(4) Beryl Substation to Lincoln Junction (Dry Valley)
	(5) Beryl Substation to St. George
	(6) Lincoln Junction to Gypsum Junction
d.	Lake Valley
e.	Northern Corridor
f.	Interstate 15
g.	Route 66
h.	North Lucerne Valley
i.	Delamar Mountain Wilderness Study Area Alternative
j.	Muddy Mountain Wilderness Study Area Alternative

Tables 8-3 to 8-9 explain and compare the major realignment alternatives and applicant's proposal--including specific impacts, specific mitigating measures, and unavoidable adverse impacts. Where applicable, items are listed opposite to each other for comparative analysis. Tables 8-10 through 13 compare wilderness values and visual resources of the minor realignments.

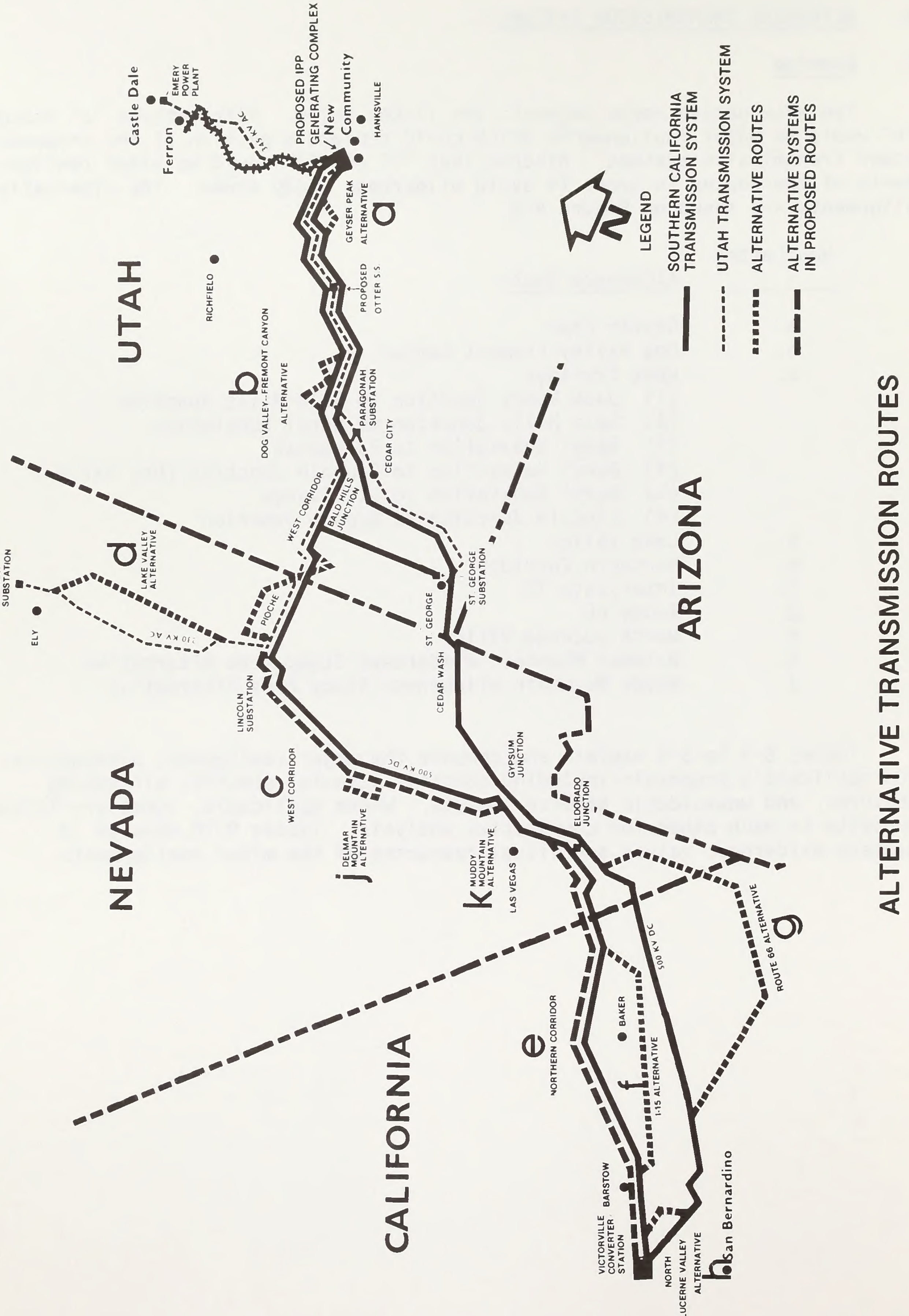

ALTERNATIVE TRANSMISSION ROUTES
LEGEND
SOUTHERN CALIFORNIA TRANSMISSION SYSTEM
UTAH TRANSMISSION SYSTEM
ALTERNATIVE ROUTES
ALTERNATIVE SYSTEMS IN PROPOSED ROUTES
N
UTAH
NEVADA
ARIZONA
CALIFORNIA
Castle Dale
EMERY POWER PLANT
Ferron
PROPOSED IPP GENERATING COMPLEX
New Community
HANKSVILLE
GEYSER PEAK ALTERNATIVE
a
RICHFIELD
PROPOSED OTTER S.S
b
DOG VALLEY--FREMONT CANYON ALTERNATIVE
PARAGONAH SUBSTATION
CEDAR CITY
WEST CORRIDOR
BALD HILLS JUNCTION
ST. GEORGE SUBSTATION
ST. GEORGE
CEDAR WASH
GONOOR SUBSTATION
ELY
d
LAKE VALLEY ALTERNATIVE
230 KV AC
345 KV AC
PIOCHE
LINCOLN SUBSTATION
c
WEST CORRIDOR
500 KV DC
j
DELMAR MOUNTAIN ALTERNATIVE
k
MUDDY MOUNTAIN ALTERNATIVE
LAS VEGAS
GYPSUM JUNCTION
ELDORADO JUNCTION
e
NORTHERN CORRIDOR
BAKER
f
I-15 ALTERNATIVE
500 KV DC
g
ROUTE 66 ALTERNATIVE
BARSTOW
VICTORVILLE CONVERTER STATION
NORTH LUCERNE VALLEY ALTERNATIVE
h
San Bernardino

FIGURE 8-8

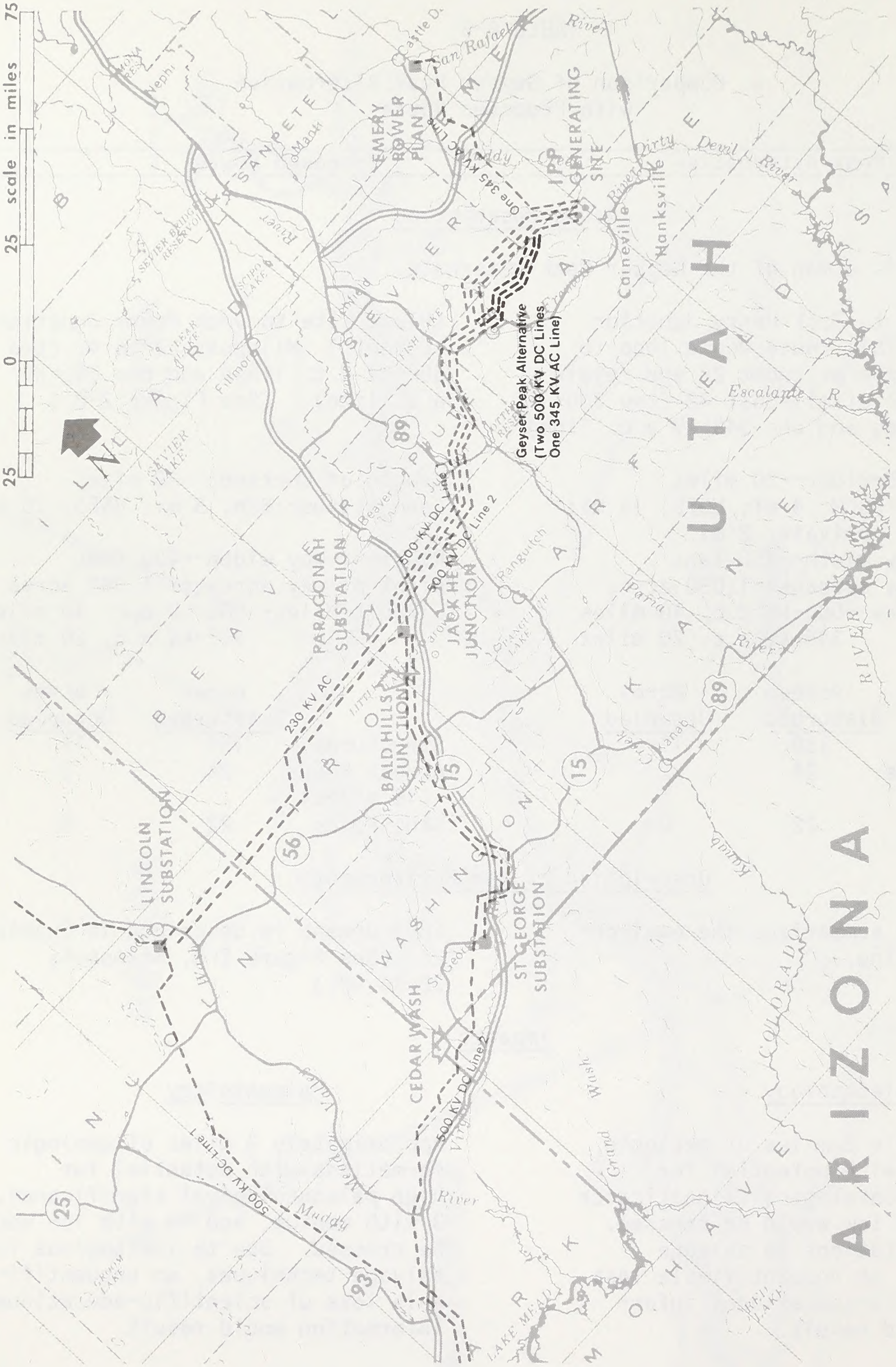
TABLE 8-3

a. Comparison of Geyser Peak Alternative
with Proposed Route

Geyser Peak Alternative	Proposed Route
Route Description	
Figure 8-9 is a map of the Geyser Peak Alternate.	
(Plant site to Jack Henry Junction segment.) This route would loop to the south from milepost 22 and rejoin the proposal at milepost 42 (two 500-kV d.c. lines and one 345-kV a.c. line).	(Plant site to Jack Henry Junction segment.) Milepost 22 to 42 (two 500-kV d.c. lines and one 345-kV a.c. line). (See Figure 2-B.)
Length of Corridor--20 miles Land Status--BLM, 4 mi; USFS, 14 mi; private, 2 mi. Right-of-way width--450 feet Right-of-way acreage--1,090 acres Circuit Miles--500-kV d.c. 40 miles 345-kV a.c. 20 miles	Length of Corridor--20 miles Land Status--BLM, 5 mi; USFS, 15 mi. Right-of-way width--450 feet Right-of-way acreage--1,090 acres Circuit Miles--500-kV d.c. 40 miles 345-kV a.c. 20 miles

	Acres Disturbed	Acres Occupied		Acres Disturbed	Acres Occupied
Structures	159	11	Structures	159	11
Access Roads (16 miles)	24	2	Access Roads (16 miles)	24	2
Stub Roads	22	0	Stub Roads	22	0

Geyser Peak Alternative	Proposed Route
Description of the Environment	
Figure 8-10 summarizes the environmental setting.	Environment is described in Chapter 2. (See Figure 2-B, mileposts 22 to 42.)
Impacts	
Paleontology	Paleontology
Approximately 5 miles of geologic formations with potential for medium paleontological significance and 15 with low would be crossed. Due to limitations in salvage techniques, an unquantifiable loss of scientific-educational information would result.	Approximately 3 miles of geologic formations with potential for high paleontological significance, 3 with medium, and 14 with low would be crossed. Due to limitations in salvage techniques, an unquantifiable loss of scientific-educational information would result.



GEYSER PEAK ALTERNATIVE ROUTE

FIGURE 8-9

ENVIRONMENTAL PROFILE: GEYSER PEAK ALTERNATIVE

LEGEND

VEGETATION
- F- Forest
- MB- Mountain Brush
- PJ- Pinyon Juniper
- CD- Cold Desert Shrub
- HD-J Joshua Tree Forest
- C- Chaparral
- B- Barren
- R- Riparian
- UA- Urban Agriculture
- HD- , Hot Desert Shrub

SOIL TYPE
- 1- Deep Alluvial Valley
- 2- Shallow, Shale-Clay
- 3- Shallow, Rocky
- 4- Desert
- 5- Mountain and Foothills

EROSION HAZARD
- 1- Slight-Moderate
- 2- Moderate-High
- 3- Severe

VISUAL FEATURES

SCENIC QUALITY
- A- High
- B- Medium
- C- Low

VISUAL ZONES
- F/M- Foreground/Middleground
- B- Background
- SS- Seldom Seen

SENSITIVITY
- H- High
- M- Medium
- L- Low

EXISTING MANMADE CONTRAST
- H- High
- M- Medium
- L- Low

LAND USE
- R- Open Range
- F- Forest
- U- Urban
- A- Agriculture
- B- Barren

PLANNING UNIT BY NAME

AREAS OF SPECIAL CONCERN (AOSC)
- U-LD-Urban Low Density
- Ag- Agriculture
- R-II- U.S. Forest Service Rare II Wilderness Recommendation
- WSA-BLM Wilderness Study Area
- RA- BLM Uninventoried Roadless Area
- Others- By Name

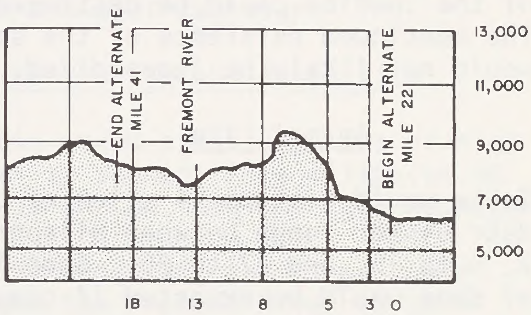
POLITICAL SUBDIVISIONS BY NAME

HABITAT OF SPECIAL ANIMAL LIFE
- UPD- Utah Prairie Dog
- DT- Desert Tortoise Concentration
- F- Threatened or Endangered Fish
- G- Gila Monster
- R- Raptor Concentration Area
- BF- Potential Black-footed Ferret
- BT- Bendire's Thrasher and Gilded Flicker
- WH- Wild Horses
- WB- Wild Burros
- U- Species
- WF- Water Fowl

IMPORTANT GAME HABITAT
- D- Critical Deer Range
- B- Desert Bighorn Sheep Range
- PB- Potential Desert Bighorn Sheep Range
- S- Sage Grouse Concentration Area
- P- Pheasant Habatat

CULTURAL RESOURCES: NUMBER OF SITES
- ( ) Eligible for National Register

PALEONTOLOGICAL RESOURCES
- H- Potentially High Paleontological Significance
- M- Potentially Medium Paleontological Significance
- L- Low Paleontological Significance



VEGETATION	CD | PJ | CD | F | CD
SOILTYPES	5
EROSION HAZARD	2
SCENIC QUALITY	B | C | B | A | B
VISUAL ZONE	F/M | B | SS
SENSITIVITY	M | H | L
EXISTING CONTRAST	L
LAND USE	R
PLANNING UNIT	PARKER MTN | FREMONT (U.S.F.S.) | FOREST
A. O. S. C.	NONE | SB & WCSA | NONE
POLITICAL SUB	WAYNE COUNTY, UTAH | SEVIER CO., UTAH
SPECIAL ANIMALS	UPD | | R |
GAME ANIMALS	D | | D
CULTURAL RESOURCES	2 | 2
PALEONTOLOGY	| L | L | L | M | L

FIGURE 8-10

TABLE 8-3 (continued)

Geyser Peak Alternative	Proposed Route
Soils	**Soils**
No impacts identified.	Severe erosion and slumping could occur between milepost 22 and 26.
Vegetation	**Vegetation**
One proposed endangered plant grows along this route (see Appendix VIII-1). Even with federally required measures, it is possible that individual plants of the species could be destroyed. The continued existence of the species would not likely be jeopardized.	No candidate, proposed or listed threatened or endangered plant species occurs along this segment.
Animal Life	**Animal Life**
Route would disturb 14 miles of critical deer winter range between mileposts 0 to 2, 6 to 15, and 17 to 20. Some loss of deer would be expected if construction were to occur on critical winter from December through April.	Route would disturb 18 miles of critical deer winter range between milepost 19 to 25 and 30 to 42. Some loss of deer would be expected if construction were to occur on critical winter range from December through April.
Three miles of golden eagle nesting habitat between mileposts 4 to 7 would be traversed. Eagles would be driven from nests and an unquantifiable loss of young eagles would result if construction were to take place during March through May nesting season.	No impacts identified.
	The proposed route would disturb 53 acres of sage grouse concentration in Forsyth Valley (mileposts 25 to 30). Sage grouse mating could be disrupted by construction activities which would lower production for 1 year.
	Transmission structures would provide perching sites for raptors near sage grouse concentration areas (mileposts 25-30). This would make grouse more susceptible to predation and result in an unknown reduction in population.

TABLE 8-3 (continued)

Geyser Peak Alternative	Proposed Route
	The transmission line access roads could increase access to UM Creek and deteriorate the wild trout fishery.
Cultural Resources	Cultural Resources
The alternate line would cross four known sites, none of which are eligible for the National Register.	Between mileposts 22 to 42, the proposed transmission line would cross over four known sites, none of which is eligible for the National Register.
Recreation and Aesthetics	Recreation and Aesthetics
Route would cross 13 miles of high quality scenery on the Thousand Lake Mountain, mileposts 3 to 16.	Route would cross 10 miles of high quality scenery from mileposts 26 to 36 on the Thousand Lake Mountain.
	At milepost 36, the lines would cross the Fremont River in an area of high scenic quality and high sensitivity.
No impacts identified.	The visual intrusion at the Fremont River Recreation Complex, along the Fremont River, would reduce the quality of the recreation experience for those using the area.
Mitigating Measures	
Besides the applicant committed and federal, local, and state required measures, the following mitigating measures would apply to specific impacts along the Geyser Peak alternative:	
Animal Life	Animal Life
B-4 (Chapter 4) would mitigate the disturbance of deer winter range on federal land between mileposts 0 to 2, 6 to 15, and 17 to 20.	Chapter 4, B-4 (deer winter range).
To mitigate impact on the raptor nesting area (milepost 4 to 7), transmission line construction would cease in raptor nesting areas from March through May as directed by the appropriate federal official.	Chapter 4, B-4 (sage grouse). Chapter 4, B-6 (UM Creek).

TABLE 8-3 (continued)

Geyser Peak Alternative	Proposed Route
Aesthetics	Aesthetics
Impact on aesthetics values would be mitigated by measures B-7, 8, 9, and 11.	Chapter 4, B-7, 8, 9, and 11.
Adverse Impacts Which Cannot Be Avoided	
Paleontology	Paleontology
Approximately 5 miles of geologic formations with potential for medium paleontological significance and 15 with low significance would be crossed. Due to limitations in salvage techniques, an unquantifiable loss of scientific-educational information would result.	Approximately 3 miles of geologic. formations with potential for high paleontological significance, 3 with medium, and 14 with low significance would be crossed. Due to limitations in salvage techniques, an unquantifiable loss of scientific-educational information mation would result.
Soils	Soils
No impacts identified.	Severe erosion and slumping could occur between mileposts 22 to 26.
Vegetation	Vegetation
Some individual plants of a proposed endangered plant species could be inadvertently destroyed. (See Appendix VIII-1.)	No candidate, proposed or listed species of threatened or endangered plant species have been identified along this route.
Animal Life	Animal Life
No impact identified.	Transmission structures would provide perching sites for raptors near sage grouse concentration areas (mileposts 25 to 30) which could lead to loss of grouse to raptors.
Cultural Resources	Cultural Resources
Even with full implementation of proposed mitigating measures, some losses would occur due to vandalism and construction.	Even with full implementation of proposed mitigating measures, some losses would occur due to vandalism and construction.
Aesthetics	Aesthetics
Thirteen miles of high quality scenery would be crossed.	Ten miles of high quality scenery would be crossed.

TABLE 8-3 (concluded)

Geyser Peak Alternative	Proposed Route
Recreation	Recreation
No impact identified.	The recreational experience in the Fremont River Recreation Complex would be reduced.

TABLE 8-4

b. Comparison of Dog Valley-Fremont Canyon Alternative with the Proposed Route

Dog Valley-Fremont Canyon Alternative	Proposed Route

Route Description

Figure 8-11 is a map of the Dog Valley-Fremont Canyon alternative and the proposed route.

Dog Valley-Fremont Canyon Alternative	Proposed Route
From milepost 90, the alternative would depart the proposed route and extend northwest, rejoining the proposed corridor at milepost 106. (Two 500-kV d.c. lines and one 345-kV a.c. line.)	Milepost 90 to 106 (two 500-kV d.c. lines and one 345-kV line).
Length of Corridor-23 miles Land Status--BLM, 21 mi; private, 1 mi; State, 1 mi. Right-of-way width--450 feet Right-of-way acreage-1,254 acres Circuit Miles--500-kV d.c. 46 miles 345-kV a.c. 23 miles	Length of Corridor-16 miles Land Status--BLM, 13 mi; private 2 mi; State 1 mi. Right-of-way width--450 feet Right-of-way acreage--873 acres Circuit Miles--500-kV d.c. 32 miles 345-kV a.c. 16 miles

	Acres Disturbed	Acres Occupied
Structures	182	12
Access Roads (19 mi)	32	0
Stub Road	25	0

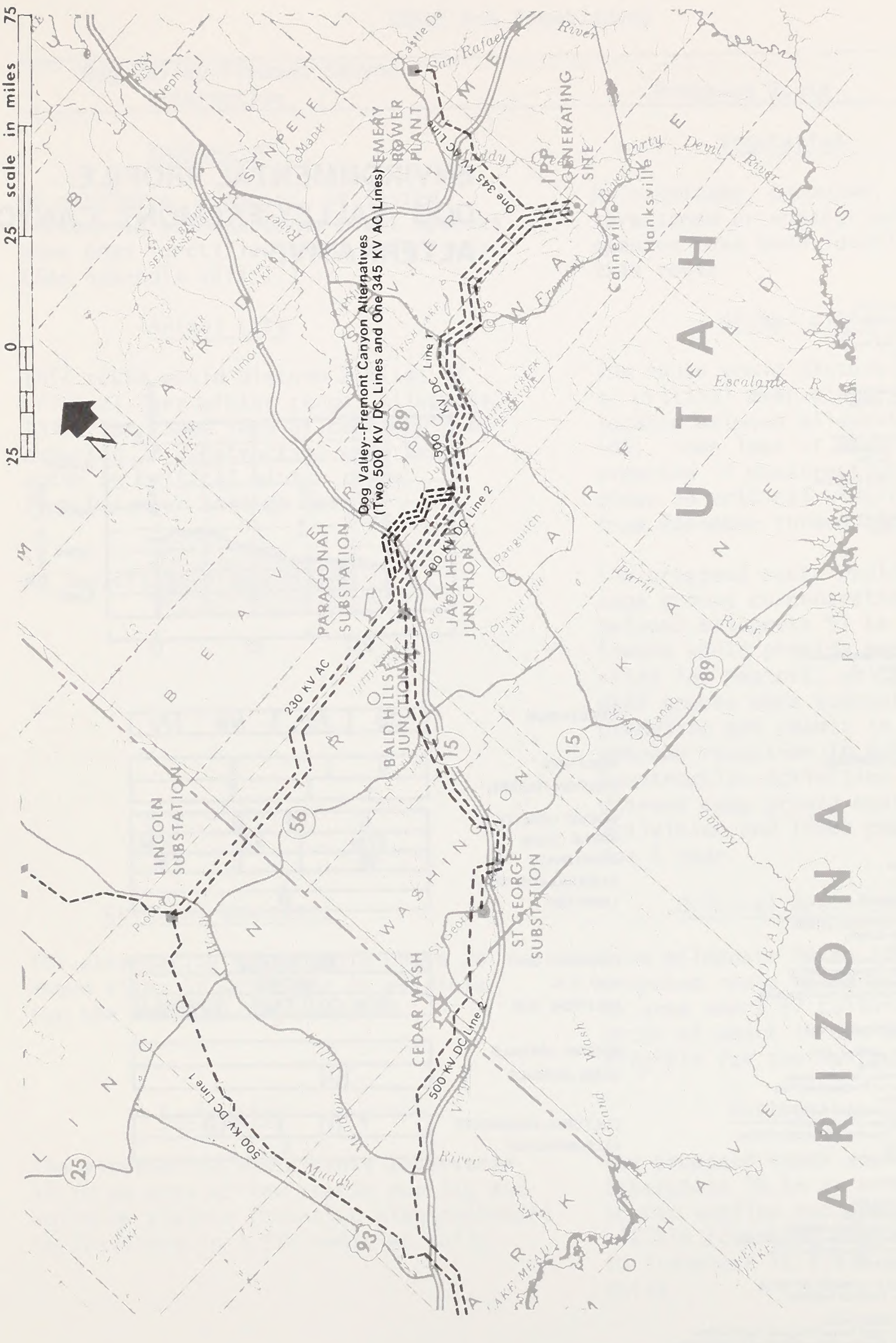
	Acres Disturbed	Acres Occupied
Structures	127	9
Access Roads	Currently existing	
Stub Roads	17	0

Description of the Environment

Dog Valley-Fremont Canyon Alternative	Proposed Route
Figure 8-12 summarizes the environmental setting.	A description of environment is found in Chapter 2. (See Figure 2-B, mileposts 90 to 106.)

Impacts

Paleontology	Paleontology
Approximately 23 miles of geologic formation with low paleontological significance would be crossed. Due to limitations in salvage techniques, an unquantifiable loss of scientific-educational information would result.	Approximately 2 miles of geological formations with potential for medium paleontological significance, and 14 with low significance would be crossed. Due to limitations in salvage techniques, an unquantifiable loss of scientific-educational information would result.



DOG VALLEY--FREMONT CANYON ALTERNATIVE

FIGURE 8-11

ENVIRONMENTAL PROFILE: DOG VALLEY-FREMONT CANYON ALTERNATIVE

LEGEND

VEGETATION
- F- Forest
- MB- Mountain Brush
- PJ- Pinyon Juniper
- CD- Cold Desert Shrub
- HD-J Joshua Tree Forest
- C- Chaparral
- B- Barren
- R- Riparian
- UA- Urban Agriculture
- HD- Hot Desert Shrub

SOIL TYPE
- 1- Deep Alluvial Valley
- 2- Shallow, Shale-Clay
- 3- Shallow, Rocky
- 4- Desert
- 5- Mountain and Foothills

EROSION HAZARD
- 1- Slight-Moderate
- 2- Moderate-High
- 3- Severe

VISUAL FEATURES

SCENIC QUALITY
- A- High
- B- Medium
- C- Low

VISUAL ZONES
- F/M- Foreground/Middleground
- B- Background
- SS- Seldom Seen

SENSITIVITY
- H- High
- M- Medium
- L- Low

EXISTING MANMADE CONTRAST
- H- High
- M- Medium
- L- Low

LAND USE
- R- Open Range
- F- Forest
- U- Urban
- A- Agriculture
- B- Barren

PLANNING UNIT BY NAME

AREAS OF SPECIAL CONCERN (AOSC)
- U-LD-Urban Low Density
- Ag- Agriculture
- R-II- U.S. Forest Service Rare II Wilderness Recommendation
- WSA-BLM Wilderness Study Area
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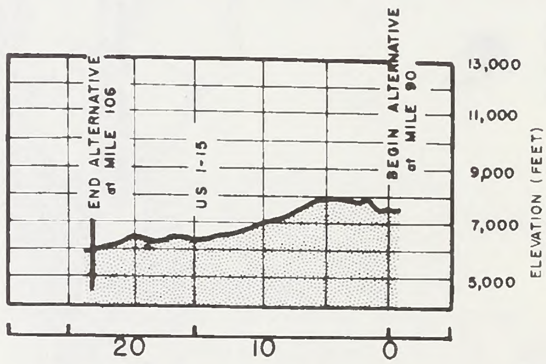
POLITICAL SUBDIVISIONS BY NAME

HABITAT OF SPECIAL ANIMAL LIFE
- UPD- Utah Prairie Dog
- DT- Desert Tortoise Concentration
- F- Threatened or Endangered Fish
- G- Gila Monster
- R- Raptor Concentration Area
- BF- Potential Black-footed Ferret
- BT- Bendire's Thrasher and Gilded Flicker
- WH- Wild Horses
- WB- Wild Burros
- U- Species
- WF- Water Fowl

IMPORTANT GAME HABITAT
- D- Critical Deer Range
- B- Desert Bighorn Sheep Range
- PB- Potential Desert Bighorn Sheep Range
- S- Sage Grouse Concentration Area
- P- Pheasant Habatat

CULTURAL RESOURCES: NUMBER OF SITES
- ( ) Eligible for National Register

PALEONTOLOGICAL RESOURCES
- H- Potentially High Paleontological Significance
- M- Potentially Medium Paleontological Significance
- L- Low Paleontological Significance



VEGETATION	CD	PJ	MB	PJ
SOILTYPES	4	5		
EROSION HAZARD	1	2		
SCENIC QUALITY	C	B	C	
VISUAL ZONE	F/M	SS	FM	
SENSITIVITY	M	L	M	
EXISTING CONTRAST	L			
LAND USE	R			
PLANNING UNIT	BUCKSKIN			
A. O. S. C.	NONE			
POLITICAL SUB	IRON CO.(UTAH)	GARFIELD		
SPECIAL ANIMALS				
GAME ANIMALS	D			
CULTURAL RESOURCES	7 (1)	2(1)		
PALEONTOLOGY	L			

FIGURE 8-12

TABLE 8-4 (continued)

Dog Valley-Fremont Canyon Alternative	Proposed Route
Vegetation	Vegetation
No candidate, proposed, or listed threatened or endangered plant species have been identified along this route. (See Appendix VIII-1.)	No candidate, proposed, or listed threatened or endangered plant species have been identified along this route.
Animal Life	Animal Life
This route would disturb 2 miles of critical deer winter range, mileposts 13 to 15. Some loss of deer would be expected if construction were to occur on critical winter range from December through April.	The route would disturb 5 miles of critical deer winter range located between milepsots 101 to 105. Some loss of deer would be expected if construction were to occur on critical winter range from December through April.
No impacts were identified	The proposed route would disturb sage grouse concentration areas between mileposts 91 to 102. The towers would provide perching sites for raptors, which would make grouse more susceptible to predation and result in an unknown reduction in population. Construction activities could disrupt sage grouse nesting activities and lower production for 1 year.
Cultural Resources	Cultural Resources
The alternative route would cross 28 known sites of which one is eligible for the National Register.	From mileposts 95 to 106, the proposed route would pass through an area where 67 cultural sites occur of which 10 are potentially eligible for the National Register.
Aesthetics	Aesthetics
The alternative would cross Interstate 15 in an area of low scenic quality and would be visible (creating high contrast) to travelers in 4,970 vehicles daily.	The proposed route would cross Interstate 15 in an area of low scenic quality and would be visible (creating high contrast) to travelers in 4,970 vehicles daily.

TABLE 8-4 (continued)

Dog Valley-Fremont Canyon Alternative	Proposed Route
About 6 miles of transmission line corridor would be in the foreground to Interstate 15 in an area of low scenic quality, visible to travelers in 4,970 vehicles daily.	The proposed route would cross highway U-20 in an area of low scenic quality, visible (high contrast) to travelers in 320 vehicles daily. About 1 mile of the transmission line corridor would be in the foreground to Interstate 15 in an area of low scenic quality, visible to travelers in 4,970 vehicles daily.
No impacts were identified.	Utah Power and Light Co. has a 345-kV power line extending through Bone Hollow (milepost 100). An addition of three power lines in this narrow corridor near Highway U-20 would have cumulative adverse impacts on aesthetic values for travelers along U-20 (ADT 320).

Mitigating Measures

The following are specific measures that would mitigate the impacts for the Dog Valley-Fremont Canyon alternative.

Dog Valley-Fremont Canyon Alternative	Proposed Route
Animal Life	Animal Life
The impact to the critical deer winter range on Federal and state land from milepost 3 to 5 would be mitigated by B-4.	Chapter 4, B-4.
Aesthetics	Aesthetics
Chapter 4, B-8, 9, and 11.	Chapter 4, B-8, 9, and 11.

Adverse Impacts Which Cannot Be Avoided

Dog Valley-Fremont Canyon Alternative	Proposed Route
Paleontology	Paleontology
Approximately 23 miles of geologic formation with low paleontological significance, would be crossed. Due to limitations in salvage techniques, an unquantifiable loss of scientific-educational information would result.	Approximately 2 miles of geological formations with potential for medium paleontological significance, and 14 with low significance would be crossed. Due to limitations in salvage techniques, an unquantifiable loss of scientific-educational information would result.

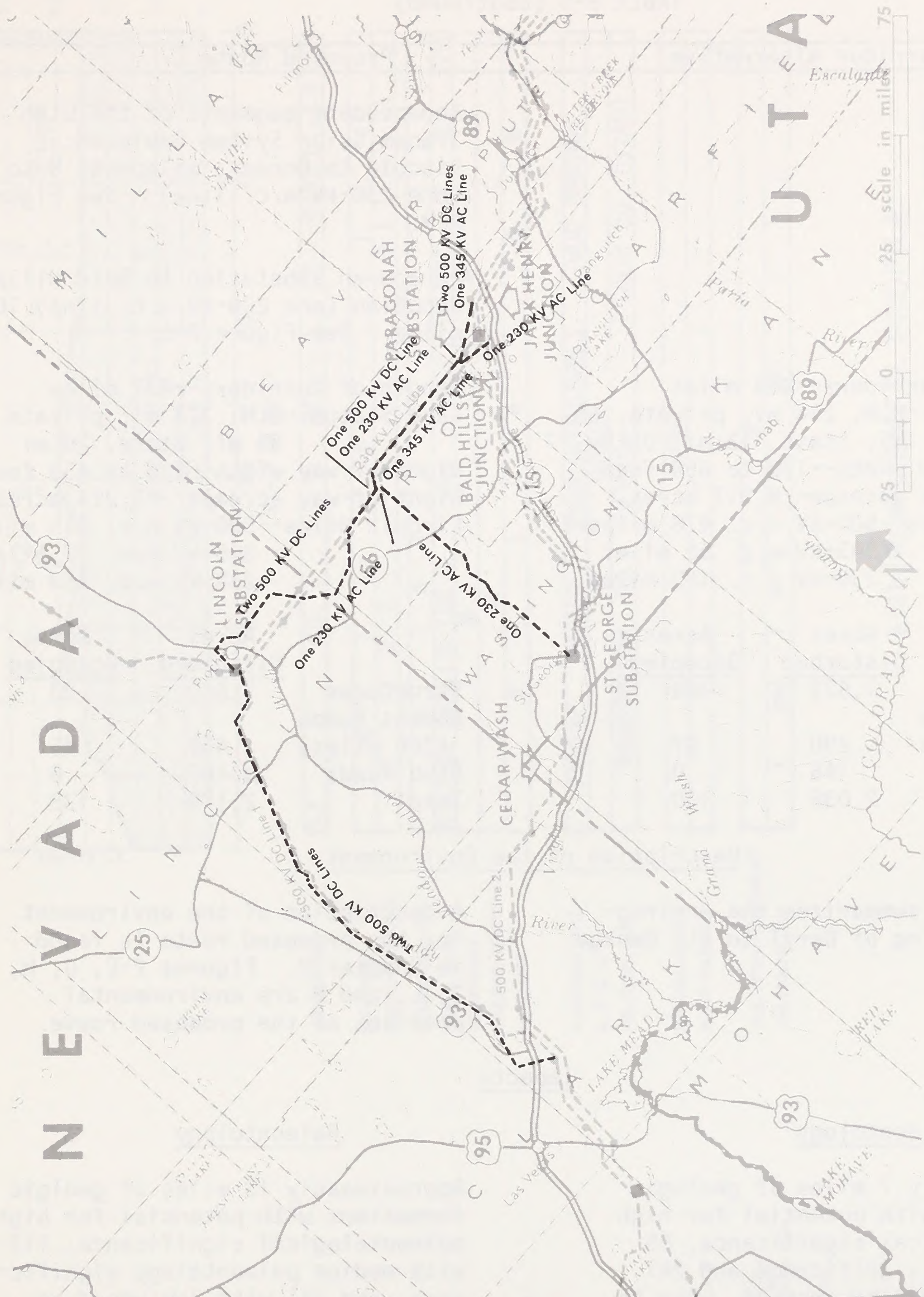
TABLE 8-4 (concluded)

Dog Valley-Fremont Canyon Alternative	Proposed Route
Animal Life	**Animal Life**
No impacts have been identified.	Predation of sage grouse by raptors would occur and population numbers would be reduced.
Cultural Resources	**Cultural Resources**
Even with full implementation of proposed mitigating measures, some losses would occur due to vandalism and construction.	Even with full implementation of proposed mitigating measures, some losses would occur due to vandalism and construction.
Aesthetics	**Aesthetics**
One highway crossing would be visible to travelers in 4,970 vehicles daily.	Two Highway crossings would be visible (low to high contrast) to travelers in 5,290 vehicles daily.
The transmission lines would parallel I-15 for about 6 miles, visible (creating high contrast) to travelers in 4,970 vehicles daily.	Aesthetic quality in the Bone Hollow area would be reduced.

TABLE 8-5

c. Comparison of West Corridor Alternative
With the Proposed Route

West Corridor Alternative	Proposed Route
The West Corridor Alternative would replace the proposed Jack Henry to Gypsum Junction segments of Line 1 and Line 2 in the Southern California Transmission System; the Paragonah to St. George segment of the Utah Transmission System; and a portion of the Lincoln to Gonder segment of the Utah Transmission System.	
Route Description	
Figure 8-13 is a map of the West Corridor alternative route.	
	Southern California Transmission System Segment replaced:
Jack Henry Junction to Bald Hills Junction (two 500-kV d.c. lines, one 345-kV a.c. line) 31 miles.	Line 1 Jack Henry Junction to Bald Hills Junction (one 500-kV d.c. line), 31 miles. See Figure 2-C.
Bald Hills Junction to Beryl substation (two 500-kV d.c. lines, one 345-kV a.c. line, and one 230 a.c. line 24 miles. A substation would be required near Beryl, 230-kV a.c.	Bald Hills Junction to Lincoln Junction (one 500-kV d.c. line and one 230-kV a.c. line) 70 miles. See Figure 2-C.
Beryl substation to Lincoln Junction via Dry Valley (two 500-kV d.c. lines and one 230-kV a.c. line up to milepost 106) 58 miles.	Lincoln Junction to Gypsum Junction (one 500-kV d.c. line) 126 miles. See Figure 2-D.
Paragonah substation to Bald Hills junction (one 230-kV a.c. line) 16 miles.	Line 2 Jack Henry Junction to Paragonah substation (one 500-kV d.c. line and one 345-kV a.c. line), 22 miles. See Figure 2-H.
Beryl substation to St. George substation (one 230-kV a.c. line) 54 miles. This segment uses an established corridor for 34 miles.	Paragonah substation to St. George substation (one 500-kV d.c. line and one 230-kV a.c. line), 61 miles. See Figure 2-H.
Lincoln Junction to Gypsum Junction (two 500-kV d.c. lines) 126 miles.	St. George substation to Cedar Wash Junction (one 500-kV d.c. line), 16 miles. See Figure 2-H.
	Cedar Wash Junction to Gypsum Junction (one 500-kV d.c. line), 89 miles. See Figure 2-I.



WEST CORRIDOR ALTERNATIVE

FIGURE 8-13

TABLE 8-5 (continued)

West Corridor Alternative	Proposed Route
	Independent segments of the Utah Transmission System Replaced: Lincoln to Gonder, mileposts 0 to 6 (one 230-kV a.c. line). See Figure 2-M. Paragonah substation to Bald Hills Junction (one 230-kV a.c. line) 16 miles. See Figure 2-L.
Length of Corridors--309 miles Land Status--BLM, 214 mi; private, 65 mi; State, 13 mi; USFS, 17 Right-of-way width--110 to 650 feet Right-of-way acreage--8,911 acres. Circuit Miles--500-kV d.c. 478 miles 345-kV a.c. 55 miles 230-kV a.c. 150 miles	Length of Corridors--437 miles Land Status--BLM, 324 mi; private 93 mi; State, 20 mi. Right-of-way width--110 to 450 feet Right-of-way acreage--13,214 acres. Circuit Miles--500-kV d.c. 415 miles 345-kV a.c. 22 miles 230-kV a.c. 153 miles

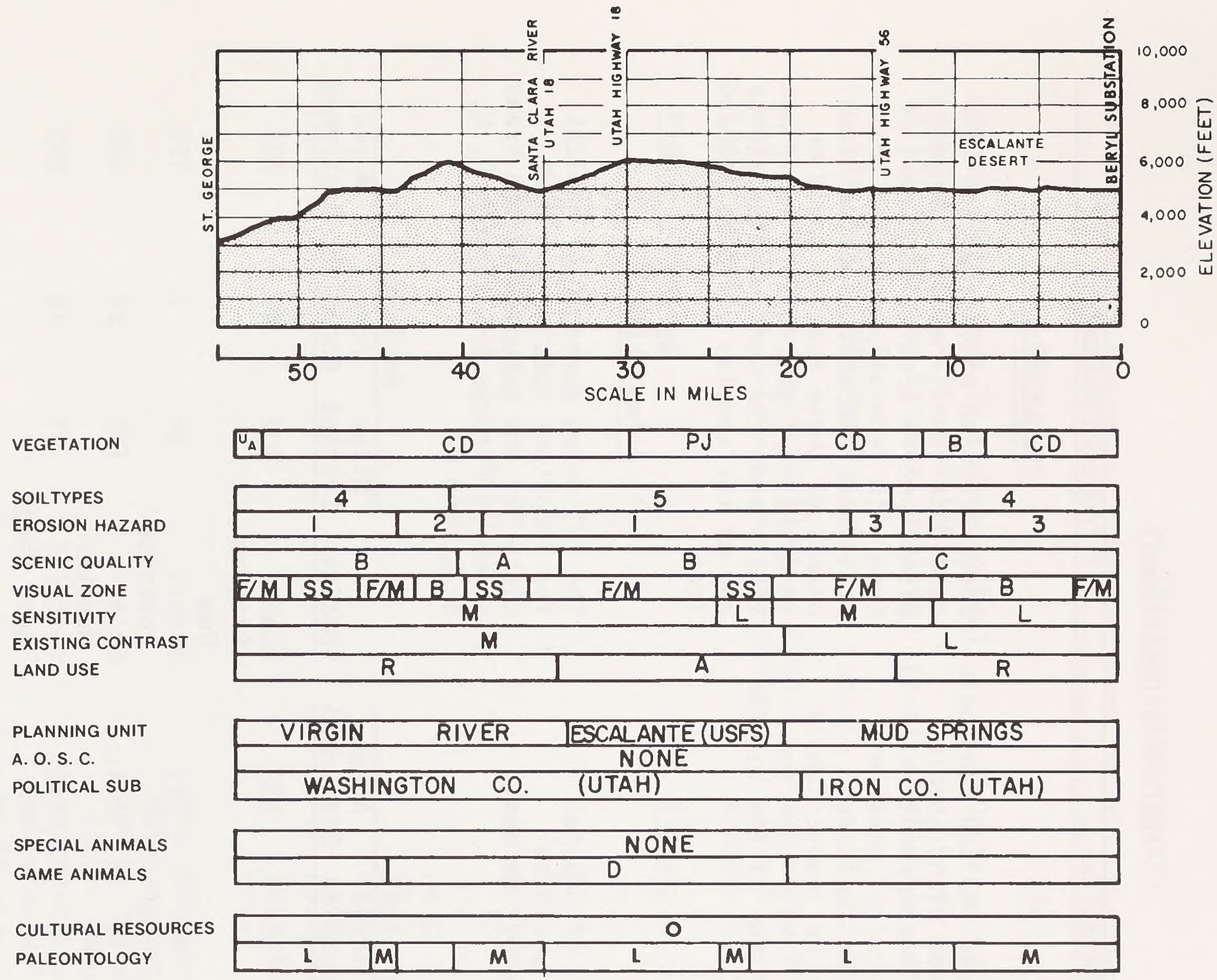
	Acres Disturbed	Acres Occupied		Acres Disturbed	Acres Occupied
Structures	1,873	103	Structures	1,622	93
Access Roads (171 miles)	290	27	Access Roads (266 miles)	450	45
Stub Roads	145	0	Stub Roads	107	0
Total	2,038	130	Total	2,179	138

Description of the Environment

West Corridor Alternative	Proposed Route
Figure 8-14 summarizes the environmental setting of Beryl to St. George segment.	A description of the environment for the proposed route is found in Chapter 2. Figures 2-C, D, H, I, L, and M are environmental profiles of the proposed route.

Impacts

Paleontology	Paleontology
Approximately 7 miles of geologic formations with potential for high paleontological significance, 55 with medium significance and 247 with low would be crossed. Due to limitations in salvage techniques, an unquantifiable loss of scientific-educational information would result.	Approximately 13 miles of geolgic formations with potential for high paleontological significance, 113 with medium paleontology significance, and 311 with low would be crossed. Due to limitations in salvage techniques, an unquantifiable loss of scientific-educational information would result.



LEGEND

VEGETATION
- F- Forest
- MB- Mountain Brush
- PJ- Pinyon Juniper
- CD- Cold Desert Shrub
- HD-J Joshua Tree Forest
- C- Chaparral
- B- Barren
- R- Riparian
- UA- Urban Agriculture
- HD- Hot Desert Shrub

SOIL TYPE
- 1- Deep Alluvial Valley
- 2- Shallow, Shale-Clay
- 3- Shallow, Rocky
- 4- Desert
- 5- Mountain and Foothills

EROSION HAZARD
- 1- Slight-Moderate
- 2- Moderate-High
- 3- Severe

VISUAL FEATURES

SCENIC QUALITY
- A- High
- B- Medium
- C- Low

VISUAL ZONES
- F/M- Foreground/Middleground
- B- Background
- SS- Seldom Seen

SENSITIVITY
- H- High
- M- Medium
- L- Low

EXISTING MANMADE CONTRAST
- H- High
- M- Medium
- L- Low

LAND USE
- R- Open Range
- F- Forest
- U- Urban
- A- Agriculture
- B- Barren

PLANNING UNIT BY NAME

AREAS OF SPECIAL CONCERN (AOSC)
- U-LD-Urban Low Density
- Ag- Agriculture
- R-II- U.S. Forest Service Rare II Wilderness Recommendation
- WSA-BLM Wilderness Study Area
- RA- BLM Uninventoried Roadless Area
- Others- By Name

POLITICAL SUBDIVISIONS BY NAME

HABITAT OF SPECIAL ANIMAL LIFE
- UPD- Utah Prairie Dog
- DT- Desert Tortoise Concentration
- F- Threatened or Endangered Fish
- G- Gila Monster
- R- Raptor Concentration Area
- BF- Potential Black-footed Ferret
- BT- Bendire's Thrasher and Gilded Flicker
- WH- Wild Horses
- WB- Wild Burros
- U- Species
- WF- Water Fowl

IMPORTANT GAME HABITAT
- D- Critical Deer Range
- B- Desert Bighorn Sheep Range
- PB- Potential Desert Bighorn Sheep Range
- S- Sage Grouse Concentration Area
- P- Pheasant Habatat

CULTURAL RESOURCES: NUMBER OF SITES
- ( ) Eligible for National Register

PALEONTOLOGICAL RESOURCES
- H- Potentially High Paleontological Significance
- M- Potentially Medium Paleontological Significance
- L- Low Paleontological Significance

ENVIRONMENTAL PROFILE: WEST CORRIDOR ALTERNATIVE

BERYL TO ST. GEORGE TRANSMISSION LINE

FIGURE 8-14

TABLE 8-5 (continued)

West Corridor Alternative

Vegetation

Four proposed endangered and two candidate threatened or endangered plant species occur along the line (see Appendix VIII-1). Even with federally required measures, it is possible that some individual plants of these species could be inadvertantly destroyed. It is not likely that the continued existence of any of the species would be jeopardized.

Animal Life

The following acreages of habitat for important species would be disturbed and occupied by the West Corridor Alternative.

Species	Habitat: Miles Crossed	Habitat: Acres Occupied	Habitat: Acres Disturbed
Utah Prairie Dog	61	35	533
Desert Tortoise	26	10	211
Gila Monster	22	10	211
Critical Deer Range	17	9	140

The impacts on these species would be as described in Chapter 3.

Approximately 46 miles of bald eagle winter concentration area would be crossed in Cedar and Parowan valleys. If bald eagles (endangered) were displaced from traditional winter roosts, it could be considered as harrassment and could have an adverse affect on the displaced birds (Joseph, 1979 and Olendorf, 1979).

Proposed Route

Vegetation

Seven proposed endangered and nine candidate threatened or endangered plant species occur along the line. Even with federally required measures, it is possible that some individual plants of these species could be inadvertantly destroyed. It is not likely that the continued existence any of the species would be jeopardized.

Animal Life

The following acreages of habitat for important species would be disturbed and occupied in the areas shown on Figures 2-C through D, H, I, L, and M.

Species	Habitat: Miles Crossed	Habitat: Acres Occupied	Habitat: Acres Disturbed
Utah Prairie Dog	107	41	411
Desert Tortoise	46	9	193
Gila Monster	112	20	455
Critical Deer Range	27	19	233

The impacts on these species would be as described in Chapter 3.

Approximately 91 miles of bald eagle winter concentration area would be crossed in Cedar and Parowan valleys. If bald eagles (endangered) were displaced from traditional winter roosts, it could be considered as harrassment and could have an adverse affect on the displaced birds (Joseph, 1979 and Olendorf, 1979).

TABLE 8-5 (continued)

West Corridor Alternative	Proposed Route
Cultural Resources	Cultural Resources
Route would cross 31 archaeological sites of which 1 is potentially eligible for the National Register.	Route would cross 91 archaeological sites of which 24 are potentially eligible for the National Register.
Recreation and Aesthetics	Recreation and Aesthetics
The alternative route would cross highways having the following average daily traffic (ADT):	The proposed transmission route would cross highways having the following average daily traffic (ADT):

West Corridor Alternative:

Highway Crossing	ADT
UT-130	250
US-93	790
US-93	700
NEV-7	65
NEV-83	250
I-15	6,645
US-18	325

Proposed Route:

Highway Crossing	ADT
UT-130	250
UT-93	790
US-93	700
NEV-7	65
NEV-83	250
I-15	6,645
UT-130	250
UT-56	1,100
UT-17	715
FAS-411	165
I-15	5,370
UT-18	870
FAS-416	190
NEV-7	580

The Jack Henry Junction to Cedar Wash segment would parallel I-15 for 85 (mileposts 1-85) miles, visible (medium to high contrast) to travelers in 4,515 to 7,800 vehicles daily. This segment would also be visible (medium to high contrast) to residents of Fremont, Kingston, Enoch, Cedar City, Harrisburg, St. George, and Santa Clara. In Nevada, the Lincoln Substation to Gypsum junction segment would parallel US-93 for 45 miles (mileposts 70 to 115) and would be visible (high contrast) to visitors in 655 to 700 vehicles daily. It would create a "tunnel effect" in combination with the existing transmission lines on the opposite side of US-93.

TABLE 8-5 (continued)

West Corridor Alternative	Proposed Route
The alternate would be visible from the following five recreation attractions or areas of high scenic quality:	The proposal would be visible from the following eight recreation attractions or areas of high scenic quality:

West Corridor Alternative:

Area	Anticipated Contrast
Mahogany Mountain	High
Highland Mountains	Medium
Pahranagst National Wildlife Refuge	Medium
Desert National Wildlife Refuge	Medium
Red Mountains	Low

Recreational values may be reduced to some visitors.

Proposed Route:

Area	Anticipated Contrast
Mahogany Mountain	High
Highland Mountains	Medium
Pahrangst National Wildlife Refuge	Medium
Desert National Wildlife Refuge	Medium
Muddy Mountains	Medium
Joshua Tree Natural Area	Medium
Red Mountains	Low
Virgin River Rec. Lands	Low

Recreational values would be reduced to some visitors.

West Corridor Alternative:

The alternate would be visible from the following six areas with potential for wilderness designation.

Area	Anticipated Contrast
RARE II 259 (Pine Valley Mountain)	Medium
WSA NV-050-IPP-07 (Delamar Mountain)	Medium
WSA NV-050-IPP-09 (Arrow Canyon)	Low
WSA UT-040-046	Medium
Desert Game Range Wilderness Proposal	Medium
WSA NV-040-206	Medium

Proposed Route:

The proposed route would be visible from the following seven areas with potential for wilderness designation.

Area	Anticipated Contrast
RARE II 259 (Pine Valley Mountain)	Medium
WSA NV-050-IPP-07 (Delamar Mountain)	Medium
WSA UT-040-046	Medum
WSA UT-040-057-AZ-010-004	Medium
WSA NV-050-IPP-15 (Muddy Mountain)	Medium
WSA NV-050-IPP-09 (Arrow Canyon)	Low
Desert Game Range Wilderness Proposal	Medium

Land Uses

West Corridor Alternative:

Where the lines would be routed within WSA NV-050-IPP-07, Delamar Mountain (200 feet within WSA for 14 miles) wilderness character and wilderness suitability would be impaired adjacent to the line, and could not be allowed prior to Congressional decision.

Proposed Route:

Where the line would be routed within BLM WSAs UT-040-057--AZ-010-004 (330 feet within WSA for 10 miles), NV-050-IPP-15, Muddy Mountain (330 feet within WSA for 4 miles) and NV-050-IPP-07, Delamar Mountain (200 feet within WSA for 14 miles),

TABLE 8-5 (continued)

West Corridor Alternative	Proposed Routes
	wilderness character (i.e., naturalness) and wilderness suitability would be impaired adjacent to the line and could not be allowed prior to congressional decision.
<u>Land Use Plans and Controls</u>	<u>Land Use Plans and Controls</u>
The following areas of special concern have been identified from land use plans and proposals along the route.	The following areas of special concern have been identified from land use plans and proposals along the route. Mahogany-Mountain (Jack Henry to Lincoln Junction, mileposts 60 to 101)--The line through this area would open undesirable access into an important wildlife and wild horse area. A scenic area would be degraded and visual elements out of character would be introduced within view of historic charcoal kilns.
Black Mountain (Table 3-9)--Land use recommendation for the Beaver and Mud Springs plans is that all future utility lines follow existing corridors. Jack Henry Junction to Bald Hills Junction segment is not within a designated corridor.	Black Mountain (Table 3-9)--Land use recommendation for the Beaver and Mud Springs plans is that all future utility lines follow existing corridors. Jack Henry Junction to Bald Hills Junction segment is not within a designated corridor. Black Ridge to St. George (mileposts 55 to 90). The land use plan states that no additional power lines should be allowed through this part of the proposed route.

<u>Mitigating Measures</u>

Besides the applicant committed and federal, local, and state required measures, the following mitigating measures would apply to specific impacts along the Geyser Peak alternative:

TABLE 8-5 (continued)

West Corridor Alternative	Proposed Route
Animal Life	**Animal Life**
The impacts to Utah prairie dog, desert tortoise, and gila monster would be mitigated by B-4 and B-5 (Chapter 4) between: Mileposts — Segment 0-35 — Jack Henry to Lincoln Jct. 50-60 100-126 — Lincoln to Gypsum Junction	Chapter 4, measures B-4 and B-5.
Impacts to Mule Deer would be mitigated by B-4 between:	Chapter 4, B-4.
Milepost — Segment 0-2 — Jack Henry to Lincoln Jct. 80-95	Chapter 4, B-4.
Impacts to bald eagles would be mitigated by B-4 between: Milepost — Segment 0-30 — Jack Henry to Lincoln Jct. 0-16 — Paragonah to Bald Hills	
Adverse Impacts Which Cannot Be Avoided	
Paleontology	**Paleontology**
Approximately 7 miles of geologic formations with potential for high paleontological significance, 55 with medium significance and 247 with low would be crossed. Due to limitations in salvage techniques, an unquantifiable loss of scientific-educational information would result.	Approximately 13 miles of geolgic formations with potential for high paleontological significance, 113 with medium paleontology significance, and 311 with low would be crossed. Due to limitations in salvage techniques, an unquantifiable loss of scientific-educational information would result.
Animal Life	**Animal Life**
Impacts to Utah prairie dog could not be avoided along 14 miles (56 acres) of private land. Actual losses of animals may not be proportionate to the acreage disturbed. It is not likely that the continued existence of any threatened or endangered species would be jeoparized by construction.	Impacts to Utah prairie dog could not be avoided along 51 miles (251 acres) of private land. Actual losses of animals may not be proportionate to the acreage disturbed. It is not likely that the continued existence of any threatened or endangered animal species would be jeoparized by construction.

TABLE 8-5 (concluded)

West Corridor Alternative	Proposed Route
Cultural Resources	Cultural Resources
Even with full implementation of proposed mitigating measures, some losses would occur due to vandalism and construction.	Even with full implementation of proposed mitigating measures, some losses would occur due to vandalism and construction.
Recreation and Aesthetics	Recreation and Aesthetics
Seven highway crossings would be visible to travelers in 9,025 vehicles daily. The lines would be visible from five recreation attractions or areas of high scenic quality, and from one RARE II area, from four Wilderness Study Areas, and one U.S. Fish and Wildlife Service Wilderness proposal.	Fourteen highway crossings would be visible to travelers in 17,940 vehicles daily. The lines would be visible to residents in seven communities. The lines would be visible from eight recration attractions or areas of high scenic quality, from one RARE II area, from five Wilderness Study Areas, and one U.S. Fish and Wildlife Service Wilderness Proposal.
Land Use Plans and Controls	Land Use Plans and Controls
No issues were identified.	Construction of power lines along Black Mountain, Black Ridge to St. George, and Mahogany Mountain would be in conflict with current management objectives.

TABLE 8-6

d. Comparison of Lake Valley Alternative with the Proposed Route

Lake Valley Alternative	Proposed Route

Route Description

Figure 8-15 is a map of the Lake Valley alternative and the proposed route.

Lake Valley Alternative	Proposed Route
(Lincoln Junction to Gonder substation segment.) From milepost 20 of the proposed route, this alternative would parallel U.S. Highway 93 for about 75 miles. As the route nears Ely, Nevada, it would extend north and west to rejoin the proposed route at milepost 95 (one 230-kV a.c. line).	Lincoln Junction to Gonder substation segment between mileposts 20 to 95 (one 230-kV a.c. line).
Corridor Length--86 miles Land Status--BLM, 83 mi; private, 3 mi. Right-of-way width--110 feet Right-of-way acreage--1,147 acres Circuit Miles--230-kV a.c. 82 miles	Corridor Length--75 miles Land Status--BLM, 75 mi. Right-of-way width--110 feet Right-of-way acreage--1,000 acres Circuit Miles--230-kV a.c. 75 miles.

Lake Valley Alternative:

	Acres Disturbed	Acres Occupied
Structures	61	12
Access Roads (6 mi)	10	0
Stub Roads	12	0

Proposed Route:

	Acres Disturbed	Acres Occupied
Structures	53	11
Access Roads (75 mi)	127	12
Stub Roads	10	0

Description of the Environment

Lake Valley Alternative	Proposed Route
Figure 8-16 summarizes the environmental setting.	A description of the environment is found in Chapter 2. Figure 2-M (mileposts 20 to 95) summarizes the environment of the proposed route.

Impacts

Lake Valley Alternative	Proposed Route
Paleontology	Paleontology
Approximately 9 miles of geologic formations with potential for medium paleontological significance and 77 with low significance would be crossed. Due to limitations in salvage techniques, an unquantifiable loss of scientific-educational information would result.	Approximately 1 mile of geologic formations with potential for high paleontological significance, 18 with medium, and 56 with low significance would be crossed. Due to limitation in salvage techniques, an unquantifiable loss of scientific-educational information would result.

LAKE VALLEY ALTERNATIVE ROUTE

FIGURE 8-15

LEGEND

VEGETATION
- F- Forest
- MB- Mountain Brush
- PJ- Pinyon Juniper
- CD- Cold Desert Shrub
- HD-J Joshua Tree Forest
- C- Chaparral
- B- Barren
- R- Riparian
- UA- Urban Agriculture
- HD- Hot Desert Shrub

SOIL TYPE
- 1- Deep Alluvial Valley
- 2- Shallow, Shale-Clay
- 3- Shallow, Rocky
- 4- Desert
- 5- Mountain and Foothills

EROSION HAZARD
- 1- Slight-Moderate
- 2- Moderate-High
- 3- Severe

VISUAL FEATURES

SCENIC QUALITY
- A- High
- B- Medium
- C- Low

VISUAL ZONES
- F/M- Foreground/Middleground
- B- Background
- SS- Seldom Seen

SENSITIVITY
- H- High
- M- Medium
- L- Low

EXISTING MANMADE CONTRAST
- H- High
- M- Medium
- L- Low

LAND USE
- R- Open Range
- F- Forest
- U- Urban
- A- Agriculture
- B- Barren

PLANNING UNIT BY NAME

AREAS OF SPECIAL CONCERN (AOSC)
- U-LD-Urban Low Density
- Ag- Agriculture
- R-II- U.S. Forest Service Rare II Wilderness Recommendation
- WSA-BLM Wilderness Study Area
- RA- BLM Uninventoried Roadless Area
- Others- By Name

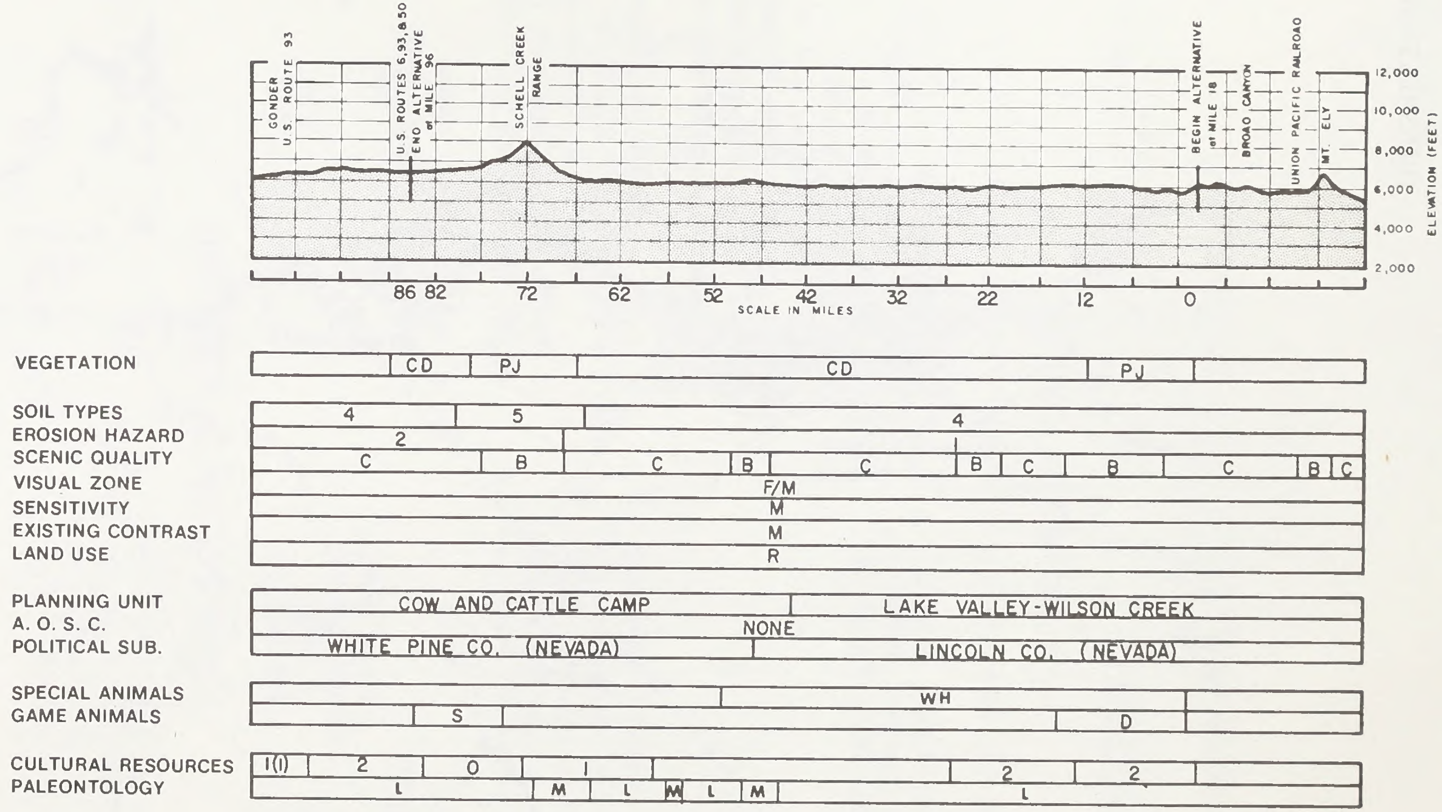
POLITICAL SUBDIVISIONS BY NAME

HABITAT OF SPECIAL ANIMAL LIFE
- UPD- Utah Prairie Dog
- DT- Desert Tortoise Concentration
- F- Threatened or Endangered Fish
- G- Gila Monster
- R- Raptor Concentration Area
- BF- Potential Black-footed Ferret
- BT- Bendire's Thrasher and Gilded Flicker
- WH- Wild Horses
- WB- Wild Burros
- U- Species
- WF- Water Fowl

IMPORTANT GAME HABITAT
- D- Critical Deer Range
- B- Desert Bighorn Sheep Range
- PB- Potential Desert Bighorn Sheep Range
- S- Sage Grouse Concentration Area
- P- Pheasant Habatat

CULTURAL RESOURCES: NUMBER OF SITES
- ( ) Eligible for National Register

PALEONTOLOGICAL RESOURCES
- H- Potentially High Paleontological Significance
- M- Potentially Medium Paleontological Significance
- L- Low Paleontological Significance



ENVIRONMENTAL PROFILE
LAKE VALLEY ALTERNATIVE

FIGURE 8-16

TABLE 8-6 (continued)

Lake Valley Alternative	Proposed Route
Vegetation	Vegetation
One candidate threatened or endangered plant species occurs along the line (see Appendix VIII-1). Even with federally required measures, it is possible that some individual plants of this species could be inadvertently destroyed. It is not likely that the continued existence of this species would be jeopardized.	One candidate threatened or endangered plant species occurs along the line. Even with federally required measures, It is possible that some individual plants of this species could be inadvertently destroyed. It is not likely that the continued existence of this species would be jeopardized.
Animal Life	Animal Life
The alternative would pass through 15 miles of critical deer winter range (mileposts 0 to 15). Some loss of deer would be expected if construction on critical winter range were to occur from December through April.	The proposed route would disturb 25 miles of critical deer winter range (mileposts 20 to 45). Some loss of deer would be expected if construction on critical winter range were to occur from December through April.
The alternative would impact 11 miles of sage grouse concentration areas (mileposts 75 to 86). Construction during March and April could disrupt sage grouse mating. This would reduce production for 1 year.	The proposal would pass through 31 miles of sage grouse concentration areas (milepost 71 to 102). Construction during March and April could disrupt sage grouse mating. This would reduce production for 1 year.
Towers would provide perching sites and result in raptor predation on sage grouse. An unknown decrease in grouse populations could occur.	Towers would provide perching sites and result in raptor predation on sage grouse. An unknown decrease in grouse populations could occur.
Cultural Resources	Cultural Resources
Eight cultural sites of which one is eligible for the National Register are located along this alternative.	Eleven cultural sites of which three are eligible for the National Register are located in this section of corridor.
The introduction of visual elements out of character with the Bristal Wells Town Site, Lincoln County, Nevada, would detract from the historic setting of this site. It is currently (April, 1979) listed on the National Register of Historic Places.	

TABLE 8-6 (continued)

Lake Valley Alternative	Proposed Route
Recreation and Aesthetics	**Recreation and Aesthetics**
The power line would parallel US-93 along with an existing 69-kV line for 75 miles, visible (high contrast) to travelers in 460 vehicles daily. The ADT on Highway 98 would decrease when Highway 38 is completed. The line would be visible from the following four recreation attractions or areas of high quality scenery:	The route would be in an undeveloped area of open space. Currently there are no power transmission lines extending through this region of Nevada. The line would be visible from the following three attractions or areas of high quality scenery:
Area / Anticipated Contrast Mt. Grafton Scenic Area (located 5 miles west of mileposts 35-40) — Low North Creek Scenic Area (located 5 miles west of milepost 41) — Low Shoshone Ponds Natural Area (located 5 miles east of milepost 60) — Low Shoshone Pygmy Sage Research Natural Area (Located 5 miles east of milepost 66) — Low	Area / Anticipated Contrast Commins Lake — High Ward Charcoal Kilns — High Mt. Grafton Scenic Area — Medium
Quality of the recreational experience may be reduced for some visitors.	Recreational values may be reduced to some visitors.
The line would be visible from the following three areas with potential for wilderness designation.	The line would be visible from the following three WSAs.
Area / Anticipated Contrast WSA NV-040-169 (Mt. Grafton) — Low BLM Instant Study Area (ISA) NV-040-099 (Pygmy Sage) east side of U.S. 93 (milepost 50-62) — Low ISA NV-040-180 (Shoshone Ponds) east side of U.S.-93 (milepost 65-67) — Low	Area / Anticipated Contrast WSA NV-040-172 (Far South Egans) — High WSA NV-040-169 (Mt. Grafton) — High WSA NV-050-168 (South Egans) — Medium
(See Appendix Wilderness for definition of Instant Study Area [ISA].)	

TABLE 8-6 (continued)

Lake Valley Alternative	Proposed Route
Land Uses	**Land Uses**
No issues were identified.	The line would pass 1/2 mile within proposed WSA NV-040-172, Far South Egans, for 3 miles (milepost 55-58) and 1/4 to 1/2 mile within proposed WSA NV-040-169, Mt. Grafton for 12 miles (milepost 65-77). Wilderness character and wilderness suitability would be impaired adjacent to the line, and could not be allowed prior to Congressional decision.
Mitigating Measures	
The following specific measures from Chapter 4 would mitigate the impacts along the Lake Valley alternative route.	
Animal Life	**Animal Life**
The impact to the critical deer winter range (milepost 0 to 15) and sage grouse strutting grounds (mileposts 75 to 86) would be mitigated on the federal land by B-4 from Chapter 4.	Chapter 4, B-4.
Adverse Impacts Which Cannot Be Avoided	
Paleontology	**Paleontology**
Approximately 9 miles of geologic formations with potential for medium paleontological significance and 77 with low would be crossed. Due to limitations in salvage techniques, an unquantifiable loss of scientific-educational information would result.	Approximately 1 miles of geologic formations with potential for high paleontological significance, 18 with medium, and 56 with low would be crossed. Due to limitations in salvage techniques, an unquantifiable loss of scientific-educational information would result.
Animal Life	**Animal Life**
The alternative would impact 11 miles of sage grouse concentration areas (mile 75 to 86). Towers would provide perching sites for raptors and result in increased predation on grouse.	The proposal would pass through 31 miles of sage grouse concentration areas (milepost 71 to 102). Towers would provide perching sites for raptors, and result in increased predation on grouse.

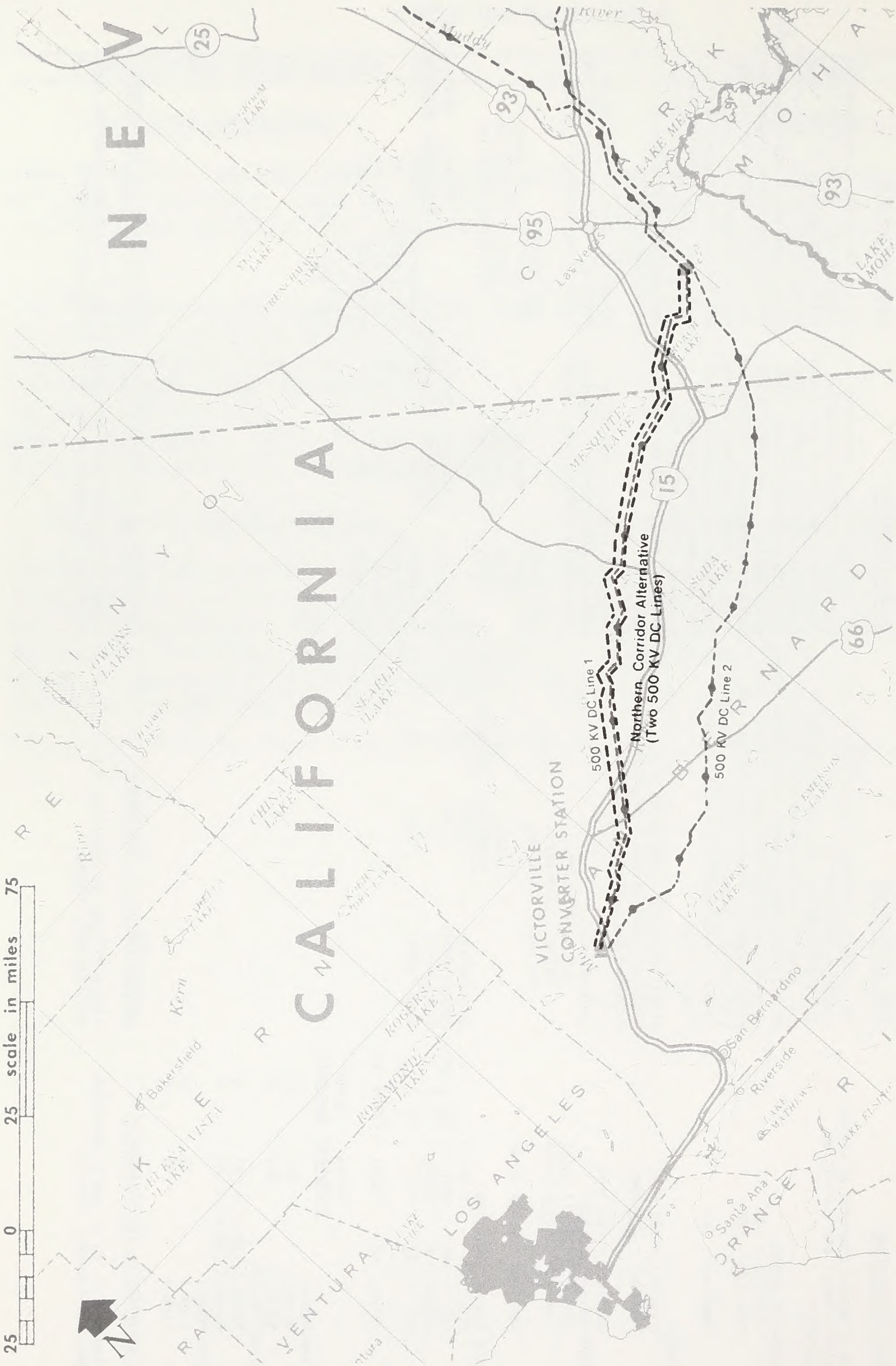
TABLE 8-6 (concluded)

Lake Valley Alternative	Proposed Route
Cultural Resources	Cultural Resources
Even with full implementation of proposed mitigating measures, some losses would occur due to vandalism and construction.	Even with full implementation of proposed mitigating measures, some losses would occur due to vandalism and construction.
The introduction of visual elements out of character with the Bristol Wells Town Site, Lincoln County, Nevada, would detract from the historic setting of this site. It is currently (April, 1979) listed on the National Register of Historic Places.	
Recreation and Aesthetics	Recreation and Aesthetics
The line would parallel US-93 for 75 miles, visible to travelers in 460 vehicles daily. The line would be visible from four recreation attractions or areas of high scenic quality, and from one WSA and two ISAs.	The line would be visible from three recreation attractions or areas of high scenic quality and from three WSAs.

TABLE 8-7

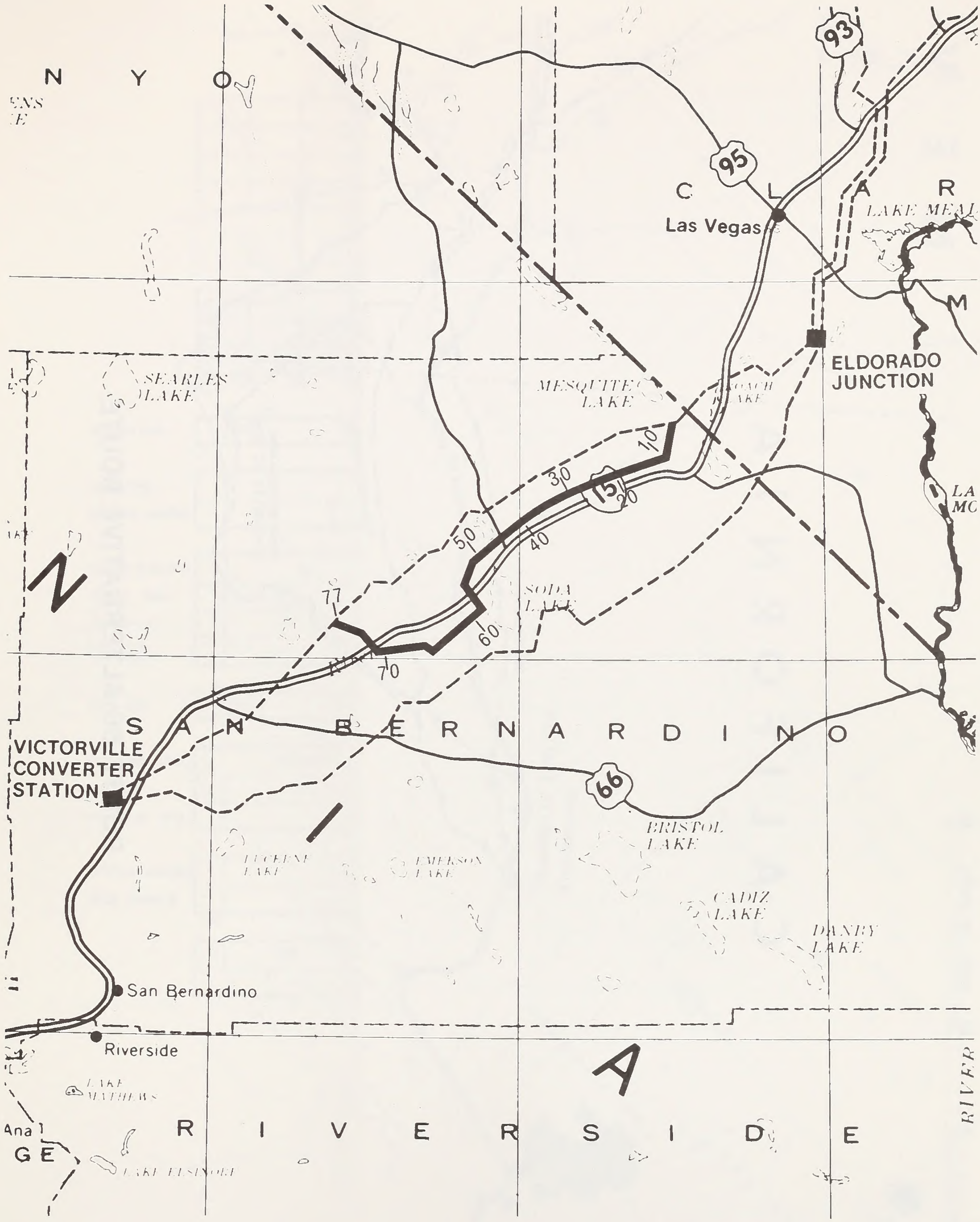
Eldorado Junction to Victorville Alternatives

Proposed Routes	e. Northern Corridor	f. Interstate Highway 15	g. Route 66
ROUTE DESCRIPTION The proposed Eldorado to Victorville lines 1 and 2 would be replaced. Length of route: Line (1) - 168 Line (2) - 178 Combined - 346 Width: Line (1) - 200 feet Line (2) - 200 feet Combined - 400 feet Right-of-way acreage: Line (1) - 4,073 acres Line (2) - 4,315 acres Combined - 8,388 acres Land Status (in miles): (Line 1) / (Line 2) BLM - 141 / BLM - 145 = 286 State- 6 / State - 6 = 12 Pri. - 21 / Pri. - 27 = 48 Total 168 / Total 178 = 346 (Acres Disturbed / Acres Occupied) Structures: Route 1: 607 / 27 Route 2: 643 / 29 Access Roads: Route 1 (27 mi.): 46 / 5 Route 2 (49 mi.): 83 / 8 Stub Roads Line 1: 32 / 0 Line 2: 38 / 0	ROUTE DESCRIPTION The northern corridor alternative is depicted in Figure 8-17. The alternative is to locate two 500 kV d.c. powerlines contiguous and south of an existing power transmission system owned by Los Angeles Department of Water and Power between Eldorado Junction and the Victorville Converter Station. Two 500 kV d.c. lines would follow the proposed Line 1 route. Length of route - 168 miles Width of right-of-way - 330 feet Right-of-way acreage - 6,720 Land Status: BLM - 141 miles State - 6 miles Private - 21 miles (Acres Disturbed / Acres Occupied) Structures: 1,210 / 54 Access Roads (27 miles): 46 / 5 Stub roads: 54 / 0	ROUTE DESCRIPTION This alternative is depicted in Figure 8-18. This alternative would have two 500 kV d.c. power transmission lines within a 330 foot right-of-way. Power lines would begin at Eldorado Junction extend southwesterly adjacent to existing powerlines for 38 miles. The alternate route would leave the proposed line Route A5 milepost 46 and rejoin the proposed route 1 at milepost 115. Length of route - 174 miles Width of right-of-way - 330 feet Area within right-of-way - 6,920 Land Status: BLM - 140 miles State - 3 miles Private - 31 miles (Acres Disturbed / Acres Disturbed) Structures: 1,246 / 56 Access Roads (37 miles: 63 / 6 Stub Roads: 89 / 0	ROUTE DESCRIPTION This alternative is depicted in Figure 8-19. It would replace a 157-mile segment of the route proposed for Line 2. The alternative route would begin at Eldorado Junction and extend southeasterly for 11 miles contiguous to and east of the existing Southern California Edison powerlines along the route (proposed for Line 2). It would then leave the proposal and rejoin it at milepost 168. Length of route - 227 miles Width of right-of-way - 330 feet Right-of-way acreage - 5,080 Land Status: BLM - 176 miles State - 11 miles Private - 40 miles (Acres Disturbed / Acres Disturbed) Structures: 1,639 / 73 Access Roads (15 miles): 25 Stub Roads (6/mile at 460 feet long): 202 / 0
DESCRIPTION OF THE ENVIRONMENT Figures 2-F, G, J, and K summarize the environmental setting.	DESCRIPTION OF THE ENVIRONMENT Figure 2-F and 2G summarize the existing environment.	DESCRIPTION OF THE ENVIRONMENT Figure 8-20 (Profile) summarizes existing environment along the I-15 route.	DESCRIPTION OF THE ENVIRONMENT Figure 8-21 summarizes the environmental setting.



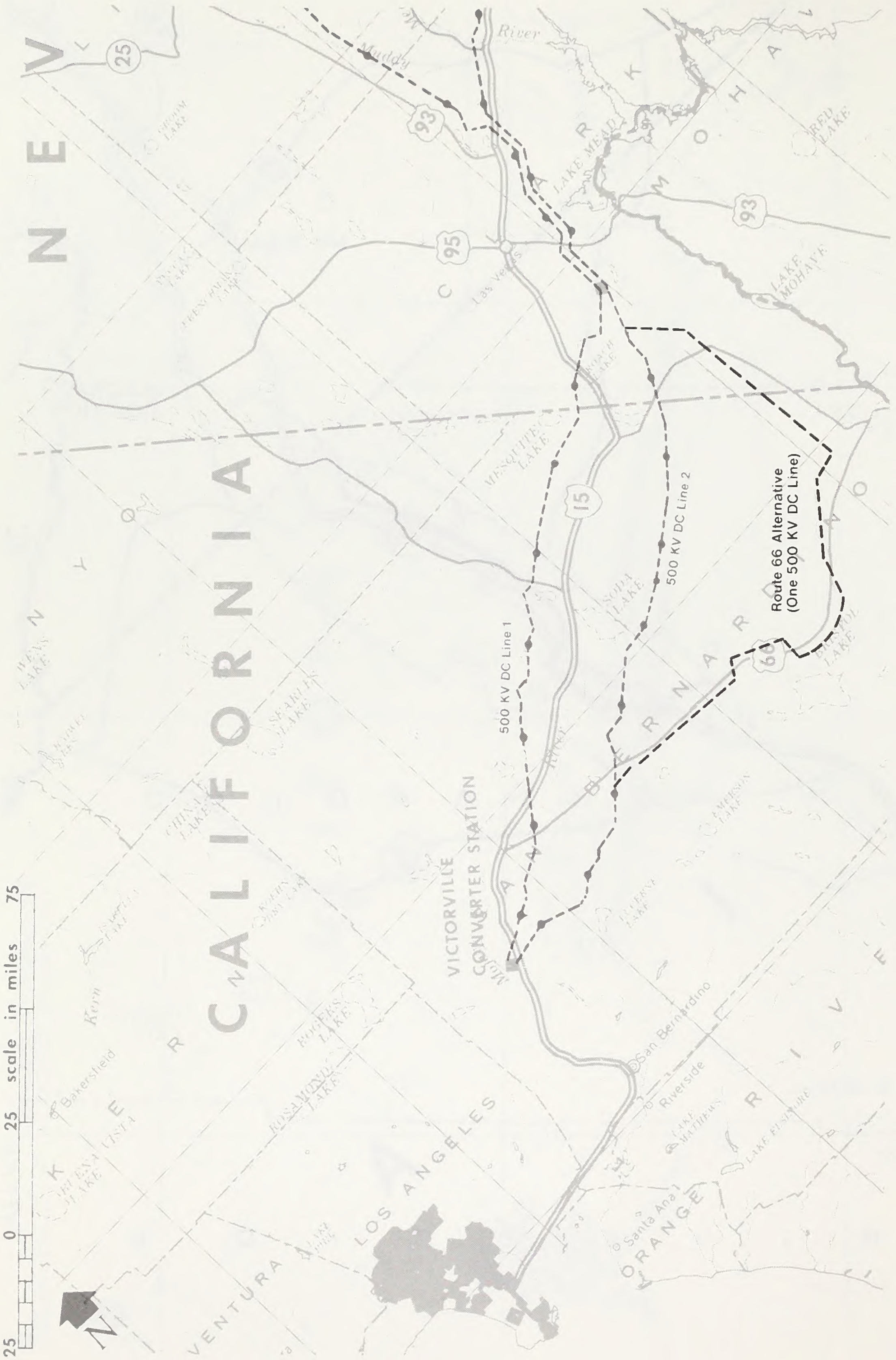
NORTHERN CORRIDOR ALTERNATIVE

FIGURE 8-17



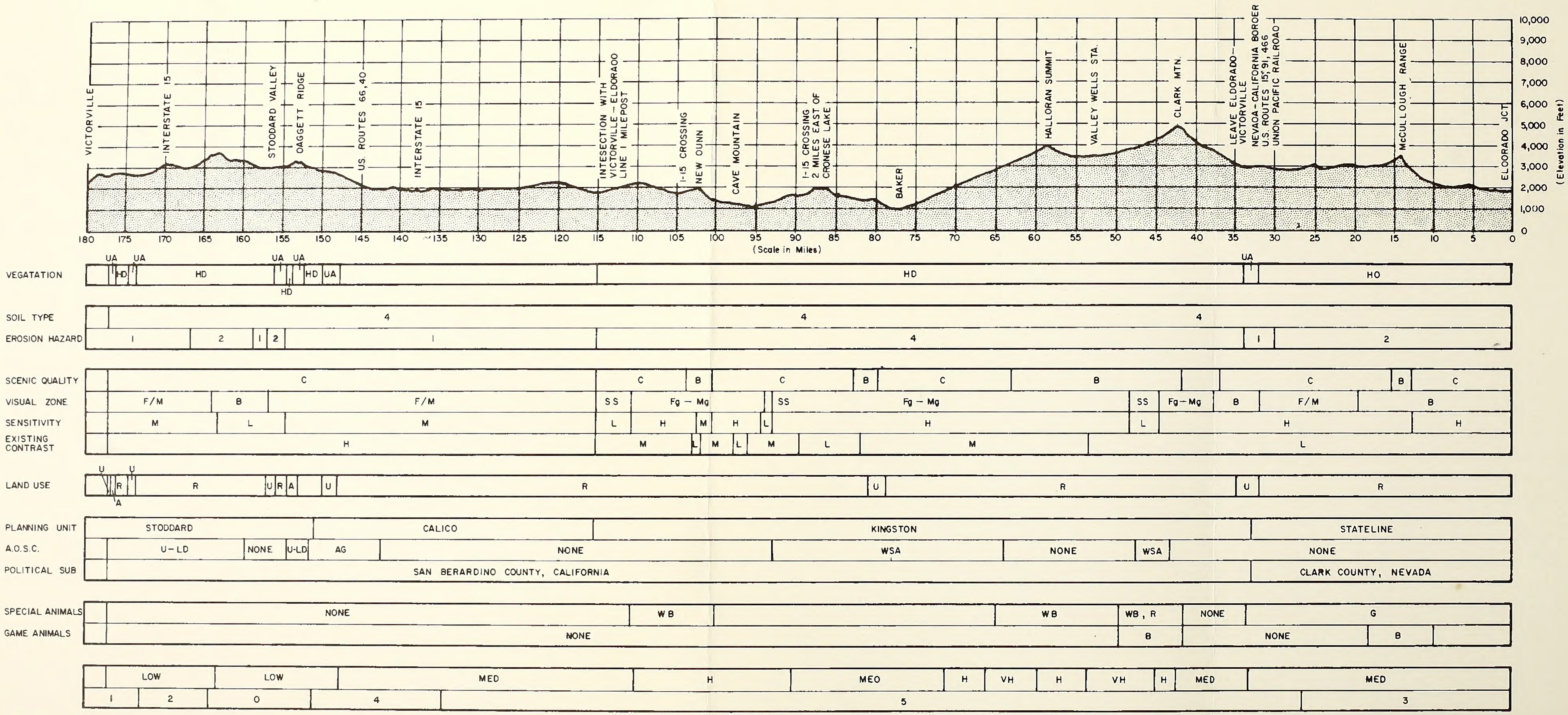
I-15 ALTERNATIVE

FIGURE 8-18



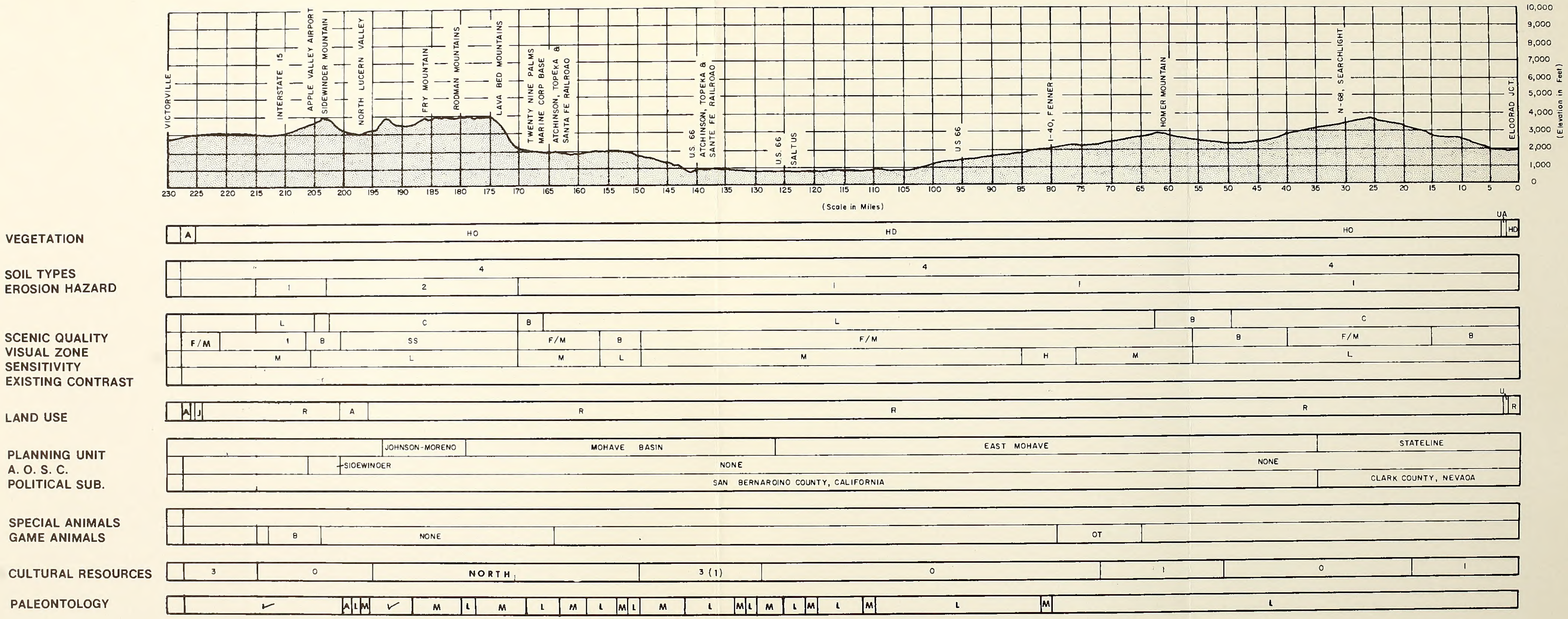
ROUTE 66 ALTERNATIVE ROUTE

FIGURE 8-19



INTERSTATE 15 ALTERNATIVE

FIGURE 8-20



ROUTE 66 ALTERNATIVE

FIGURE 8-21

TABLE 8-7 (continued)

Proposed Route	e. Northern Corridor	f. Interstate Highway 15	g. Route 66
IMPACTS	IMPACTS	IMPACTS	IMPACTS
Paleontology	Paleontology	Paleontology	Paleontology
Approximately 10 miles of geologic formation with potential for high paleontological significance, 50 with medium, and 286 with low would be crossed. Due to limitations in salvage techniques, an unquantifiable loss of scientific-educational information would result.	Approximately 8 miles of geologic formation with potential for high paleontological significance, 39 with medium, and 121 with low would be crossed. Due to limitations in salvage techniques, an unquantifiable loss of scientific-educational information would result.	Approximately 3 miles of geologic formation with potential for high paleontological significance, 49 with medium, and 123 with low would be crossed. Due to limitations in salvage techniques an unquantifiable loss of scientific-educational information would result.	Approximately 19 miles of geologic formation with potential for medium paleontological significance and 208 with low would be crossed. Due to limitations in salvage techniques, an unquantifiable loss of scientific-educational information would result.
Vegetation	Vegetation	Vegetation	Vegetation
About 1,449 acres of hot desert vegetation would be disturbed by construction activities.	About 1,310 acres of hot desert vegetation would be disturbed by construction activities.	About 1,398 acres of hot desert vegetation would be disturbed by construction activities.	About 1,866 acres of hot desert vegetation would be disturbed by construction activities.
The full return of present vegetation cover (hot desert vegetation) could require up to 30 years (Vasek, 1978).	The full return of present vegetation cover (hot desert vegetation) could require up to 30 years (Vasek, 1978).	The full return of present vegetation cover (hot desert vegetation) could require up to 30 years (Vasek, 1978).	The full return of present vegetation cover (hot desert vegetation) could require up to 30 years (Vasek, 1978).
Two proposed and seven candidate or proposed threatened or endangered plant species occur along the line (Appendix VIII-1). Even with federally required measures, it is possible that some individual plants of these species could be inadvertantly destroyed. It is not likely that the continued existence of any of the species would be jeopardized.	Eight candidate and one proposed threatened or endangered plant species occur on or near this route. There are no known threatened or endangered plant species which are officially listed (Appendix VIII-1). Even with federally required measures, it is possible that some individual plants of these species could be inadvertantly destroyed. It is not likely that the continued existence of any of the species would be jeopardized.	One officially listed, one proposed endangered and eleven candidate threatened or endangered plant species occur along the line (Appendix VIII-1). Even with federally required measures, it is possible that some individual plants of these species could be inadvertantly destroyed. It is not likely that the continued existence of any of the species would be jeopardized.	No known candidate, proposed or officially listed threatened or endangered plant species are known to occur along this route.
Animal Life	Animal Life	Animal Life	Animal Life
Transmission lines would cross 29 miles of desert bighorn sheep range in Nevada and California. Construction of transmission lines between February and May could disrupt lambing and result in the loss of desert bighorn lambs. The potential magnitude of loss is not known but could adversely affect desert bighorn populations.	Transmission lines would cross 13 miles of desert bighorn sheep range in Nevada and California. Construction of transmission lines between February and May could disrupt lambing and result in loss of desert bighorn lambs. The potential magnitude of loss is unknown but could adversely affect desert bighorn populations.	Transmission lines would cross 10 miles of desert bighorn sheep range. Opening of about 37 miles of new access roads would encourage more travel with off-road vehicles into remote areas, thus creating a potential for wildlife loss and harassment. Quantification of impacts is not possible in terms of numbers of animal life that could be lost.	The route would cross through concentrations of desert tortoise located south of Homer Mountain for approximately 15 miles. About 80 acres would be disturbed of which 8 would remain occupied for the life of the project. Some individuals or dens could be destroyed by contruction equipment and vehicular travel.

TABLE 8-7 (continued)

Proposed Route	e. Northern Corridor	f. Interstate Highway 15	g. Route 66
Approximately 28 miles of desert tortoise habitat would be crossed by Lines 1 and 2 in Ivanpah Valley. About 122 acres would be disturbed of which 6 would be occupied for the life of the project.	Approximately 3 miles of desert tortoise habitat would be crossed in Ivanpah Valley. About 24 acres would be disturbed of which 2 would be occupied for the life of the project.	Approximately 7 miles of desert tortoise habitat would be crossed in Ivanpah Valley. About 40 acres would be disturbed, of which 4 would remain occupied for the life of the project	
Some desert tortoises and other small animals could be killed by machinery. Dens, burrows and nests could be destroyed. The percent of the total habitat affected would be small.	Some desert tortoises and other small animals could be killed by machinery. Dens, burrows, and nests could be destroyed. The percent of the total habitat affected would be small.	Some desert tortoises and other animals could be killed by machinery. Dens, burrows, and nests could be destroyed. The percent of the total habitat affected would be small.	Some desert tortoises and other animals could be killed by machinery. Dens, burrows, and nests could be destroyed. The percent of the total habitat affected would be small.
Bendire's Thrasher and Gilded Flicker habitat would be disturbed (43 acres) by line 2.			
Cultural Resources	Cultural Resources	Cultural Resources	Cultural Resources
The proposed routes could impact 34 known archaeological sites of which 3 meet National Register eligibility criteria.	The alternative route could impact 22 known archaeological sites of which none meet National Register eligibility criteria.	The density of sites is estimated on Figure 8-20. The actual number of sites and their eligibility for the National Register are not known.	The alternative route could impact eight known archaeo-sites of which one meets National Register eligibility criteria.
Recreation and Aesthetics	Recreation and Aesthetics	Recreation and Aesthetics	Recreation and Aesthetics
The proposed route would cross I-15 four times at mileposts 32 (ADT - 9,950), 127 (ADT, 12,000), 158 (ADT, 16,200) and 170 (ADT, 16,200). Interstate 40 would be crossed twice at mileposts 135 (ADT, 6,700) and 125 (ADT, 5,900). NEV-68 (ADT, 375) and CA-127 (ADT, 600) would be crossed. All crossings would be in areas of low scenic quality. There are already three lines at all crossings, and additional contrast would be low. The line would be visible (low contrast) from 4 recreation attraction areas of high scenic quality: Cima Dome, Devil's Playground, Pisgah Crater, and Sidewinder. The recreational experience may be reduced to some visitors. The lines would be visible (low contrast) as viewed from within the following 21 Wilderness Study Areas: 225A, 225, 222, 222A, 227, 228, 221, 221A, 242, 266, 238B, 245, 244, 249, 243, 250, 251A, 251, 252, 207, and NV-050-IPP-17.	The alternative route would cross I-15 three times at milepost 32 (ADT, 9,950) 127 (ADT, 12,000) and 158 (ADT, 16,200), I-40 (ADT, 66,700) and CA-127 (ADT, 600). There are already three lines crossing the highways at these locations and increase in manmade contrast would be low. The lines would be visible (low contrast) as viewed from within the following 10 BLM Wilderness Study Areas: 225A, 225, 222, 222A, 227, 228, 221, 221A, 242 and NV-050-IPP-17.	The lines would parallel I-15 and would be highly visible to people (high contrast) traveling I-15 (ADT 12,000-16,000) between Eldorado Junction and Victorville. The lines would be visible from four Wilderness Study Areas as follows: Area — Anticipated Contrast 225A — Low 227 — High 223 — Low 242 — Low	The alternative route would cross a portion of I-40 that has been designated as a scenic highway in an area of low quality scenery, visible (high contrast) to travelers in 5,600 vehicles daily. It would parallel I-40 for about 4 miles (mileposts 164 to 168). The line would pass over the Pisgah Crater and adjacent to the Highland Range. Additional contrast at these areas of high scenic quality would be high. The recreational experience may be reduced to some visitors. The alternate route would be visible from 6 Wilderness Study Areas as follows: Area — Anticipated Contrast 272 — Low 260 — Medium 259 — Medium 258A — Medium 258 — Medium 304A — Medium

TABLE 8-7 (continued)

Proposed Route	e. Northern Corridor	f. Interstate Highway 15	g. Route 66
Land Use	Land Use	Land Use	Land Use
No issue identified.	No issue identified.	The alternate transmission route would occasionally parallel a large petroleum pipeline. The two 500 kV d.c. powerlines could create cathodic protection system problems and cause accelerated corrosion of the pipeline.	The alternate transmission route would occasionally parallel a large natural gas pipeline. The two 500 kV d.c. powerlines could create cathodic protection system problems and cause accelerated corrosion of the pipeline.
No impact on wilderness values is anticipated because the lines would not cross within any area having the potential for wilderness designation.	No impact on wilderness values is anticipated because the lines would not cross within any area having the potential for wilderness designation.	No impact on wilderness values is anticipated because the lines would not cross within any area having the potential for wilderness designation.	No impact on wilderness values is anticipated because the lines would not cross within any area having the potential for wilderness designation.
Land Use Plans and Controls	Land Use Plans and Controls	Land Use Plans and Controls	Land Use Plans and Controls
Cima Dome (Route 2, mileposts 48-62) is covered with a large Joshua tree forest. Though the Bureau of Land Management has not yet stated its position, there is considerable public interest for giving special designation to this area. There are, however, three powerlines already in this corridor. The proposal would be the fourth.	There are no current conflicts with federal land use plans nor with San Bernardino County plans. Planning for uses within Eldorado, Nevada is not complete.	Currently there are no conflicts with BLM Management Framework Plans nor with San Bernardino County Plans.	
The placement of a powerline through a valley south of Sidewinder Mountain (milepost 160; route 2) would violate land use planning goals. The area is scenic.			The placement of a powerline through a valley south of Sidewinder Mountain (milepost 209, route 2) would violate land use planning goals. The area is scenic.
There are no known conflicts with Land Use Plans along route 1.			
MITIGATING MEASURES	MITIGATING MEASURES	MITIGATING MEASURES	MITIGATING MEASURES
The following are specific mitigating measures that would mitigate impacts from the proposed routes.	The following are specific mitigating measures that would mitigate impacts from the alternative route.	The following are specific mitigating measures that would mitigate impacts from the alternative route.	The following are specific mitigating measures that would mitigate impacts from the alternative route.
Animal Life	Animal Life	Animal Life	Animal Life
Impacts to desert bighorn sheep would be mitigated by measure B-4 (Chapter 4) between:	Impacts to desert bighorn sheep would be mitigated by measure B-4 (Chapter 4) between:	Impacts to desert bighorn sheep would be mitigated by measure B-4 (Chapter 4) between:	Impacts to desert tortoise would be mitigated by measure B-4 and B-5 (Chapter 4) between mileposts 65-80 south of Homer Mountain.
Mileposts of Segments / Segments	Mileposts	Mileposts	
12-17 McCullough Range 40-45 Clark Mountain 92-95 Keany Pass — Eldorado to Victorville, Line 1 (see Figure 2-F) 27-33 McCullough Range 109-112 Cady Mountains 156-163 Sidewinder Mtn. — Eldorado to Victorville, Line 2 (see Figures 2-H and 2-I)	12-17 McCullough Range 40-45 Clark Mountain 92-95 Keany Pass	12-17 McCullough Range 45-50 Clark Mountain	

TABLE 8-7 (continued)

Proposed Route	e. Northern Corridor	f. Interstate Highway 15	g. Route 66
Impacts to desert tortoise would be mitigated by measures B-4 and B-5 (Chapter 4) between:	Impacts to desert tortoise would be mitigated by measures B-4 and B-5 (Chapter 4) between:	Impacts to desert tortoise would be mitigated by measures B-4 and B-5 (Chapter 4) between:	
<u>Mileposts of Segments</u> — <u>Segments</u>	<u>Mileposts</u>	<u>Mileposts</u>	
30-55 Ivanpah Valley — Eldorado to Victorville, Line 2 (see Figure 2-H)	35-38 Ivanpah Valley	33-40 Ivanpah Valley	
Impacts to Bendire's Thrasher and Gilded Flicker would be mitigated by measures B-4 and B-5 (Chapter 4) between:			
<u>Mileposts of Segment</u> — <u>Segments</u>			
55-65 Cima Oome — Eldorado to Victorville, (Line 2)			
<u>Land Uses</u>	<u>Land Uses</u>	<u>Land Uses</u>	<u>Land Uses</u>
None.	None.	Applicant would be required to provide measures or equipment which would eliminate adverse affects on the existing buried pipeline.	Applicant would be required to provide measures or equipment which would eliminate adverse affects on the existing buried pipeline.
<u>UNAVOIOABLE AOVERSE IMPACTS</u>	<u>UNAVOIOABLE AOVERSE IMPACTS</u>	<u>UNAVOIDABLE AOVERSE IMPACTS</u>	<u>UNAVOIDABLE AOVERSE IMPACTS</u>
<u>Paleontology</u>	<u>Paleontology</u>	<u>Paleontology</u>	<u>Paleontology</u>
Approximately 10 miles of geologic formation with potential for high paleontological significance, 50 with medium, and 286 with low would be crossed. Oue to limitations in salvage techniques, an unquantifiable loss of scientific-educational information would result.	Approximately 8 miles of geologic formation with potential for high paleontological significance, 39 with medium, and 121 with low would be crossed. Due to limitations in salvage techniques, an unquantifiable loss of scientific-educational information would result.	Approximately 3 miles of geologic formation with potential for high paleontological significance, 49 with medium, and 123 with low would be crossed. Oue to limitations in salvage techniques an unquantifiable loss of scientific-educational information would result.	Approximately 19 miles of geologic formation with potential for medium paleontological significance and 208 with low would be crossed. Oue to limitations in salvage techniques, an unquantifiable loss of scientific-educational information would result.
<u>Vegetation</u>	<u>Vegetation</u>	<u>Vegetation</u>	<u>Vegetation</u>
Construction of 76 miles of new access road, also stub roads; erection of towers, and other powerline construction activities could remove or trample vegetation on 1,449 acres. Complete re-establishment of native plant communities could take 30 years (Vasek, 1978).	Vegetation could be disturbed or destroyed on 1,310 acres of vegetation. Complete re-establishment of existing native plant communities could take 30 years (Vasek, 1978).	Vegetation could be disturbed or destroyed on 1,398 acres. Full re-establishment of present plant species could take up to 30 years.	Vegetation could be disturbed or destroyed on 1,866 acres. Re-establishment of existing native plant communities could take 30 years (Vasek, 1978).
It is not expected that any candidate, proposed or officially listed threatened or endangered plant species would become extinct nor critical habitat jeopardized.	It is not expected that any candidate, proposed or officially listed threatened or endangered plant species would become extinct nor critical habitat jeopardized.	It is not expected that any candidate proposed or officially listed threatened or endangered plant species would become extinct nor critical habitat jeopardized.	No candidate, proposed or listed threatened or endangered species occur along this route.

TABLE 8-7 (concluded)

Proposed Route	e. Northern	F. Interstate Highway 15	g. Route 66
Animal Life	Animal Life	Animal Life	Animal Life
The continued existence of any threatened or endangered animal species would not be jeopardized by the construction and operation of the IPP power transmission system.	The continued existence of any threatened or endangered animal species would not be jeopardized by the construction and operation of the IPP power transmission system.	The continued existence of any threatened or endangered animal species would not be jeopardized by the construction and operation of the IPP power transmission Opening of about 37 miles of new access roads could lead to additional harassment and loss of wildlife in a remote area. The numbers of animals that would be lost is not quantifiable.	The continued existence of any threatened or endangered animal species would not be jeopardized by the construction and operation of the IPP power transmission system.
Cultural Resources	Cultural Resources	Cultural Resources	Cultural Resources
Even with full implementation of proposed mitigating measures, some losses would occur due to vandalism and construction.	Even with full implementation of proposed mitigating measures, some losses would occur due to vandalism and construction.	Even with full implementation of proposed mitigating measures, some losses would occur due to vandalism and construction.	Even with full implementation of proposed mitigating measures, some losses would occur due to vandalism and construction.
Recreation and Aesthetics	Recreation and Aesthetics	Recreation and Aesthetics	Recreation and Aesthetics
There would be 8 highway crossings (Total ADT, 67,925) where increase in contrast would be low. The line would be visible (low contrast) as viewed from within four recreation attractions or areas of high scenic quality. Recreational values may be reduced to some visitors. The line would be visible (low contrast) from within 21 Wilderness Study Areas.	There would be 5 highway crossings (Total ADT, 45,450) where increase in contrast would be low. The line would be visible (low contrast) as viewed from within 10 Wilderness Study Areas.	The lines would parallel Interstate 15 and would be highly visible (high contrast) to people traveling I-15 (ADT, 12,000-16,000) between Eldorado Junction and Victorville. The lines would be visible (low to high contrast) from four Wilderness Study Areas.	The line would cross a portion of I-40 that has been designated as a scenic highway, visible to (high contrast) travelers in 5,600 vehicles daily. The line would parallel I-40 for 4 miles. The line would be visible (high contrast) from within two recreation attractions or areas of high scenic quality. The recreation experience may be reduced to some visitors. The line would be visible (low to medium contrast) as viewed from within 6 BLM Wilderness Study Areas.
Land Use	Land Use	Land Use	Land Use
Cima Dome (Route #2, milepost 48-62 is covered with a large Josua tree forest. Though the Bureau of Land Management has not yet stated its position, there is considerable public interest for giving special designation to this area, however, there are three powerlines southeast of this route, the proposal would be the fourth. The placement of a powerline through a valley south of Sidewinder Mountain (milepost 160; route 2) would violate land use planning goals. The area is scenic.	No issues identified.	No issues identified.	No issues identified. The placement of a powerline through a valley south of Sidewinder Mountain (milepost 209, route 2) would violate land use planning goals. The area is scenic

TABLE 8-8

h. Comparison of North Lucerne Valley Alternative with the Proposed Route

North Lucerne Valley Alternative	Proposed Route

Route Description

The North Lucerne Valley alternative is depicted in Figure 8-22.

North Lucerne Valley Alternative	Proposed Route
The alternative would leave the proposed route at milepost 153 on the Eldorado to Victorville Line II segment and extend northwesterly to join the northern route (Line I) at milepost 164 (one 500-kV d.c. line) and terminate at Victorville.	Eldorado to Victorville Line II segment, from milepost 153 to 178. (One 500-kV d.c. line.) See Figure 2-K.
Corridor Length--29 miles. Land Status--BLM, 16 mi; private, 13 mi. Right-of-way width--200 feet. Right-of-way acreage-703 acres. Circuit Miles--500-kV d.c. 29 miles	Corridor Length-25 miles Land Status--BLM, 8 mi; private 17 mi. Right-of-way width--200 feet Right-of-way acreage--509 acres Circuit Miles--500-kV d.c. 25 miles

North Lucerne Valley Alternative:

	Acres Disturbed	Acres Occupied
Structures	104	5
Access Roads	17	2
Stub Roads	5	0

Proposed Route:

	Acres Disturbed	Acres Occupied
Structures	90	4
Access Roads	0	0
Stub Roads	43	0

Description of the Environment

North Lucerne Valley Alternative	Proposed Route
Figure 8-23 summarizes the environmental setting.	A description of the environment is found in Chapter 2. Figure 2-K (mileposts 153-178) is an environmental profile for the proposed route.

Impacts

No specific mitigating measures have been identified for this alternative. Therefore, the adverse impacts are unavoidable.

Paleontology	Paleontology
Approximately 3 miles of geologic formations with potential for medium paleontological significance, and 26 with low would be crossed. Due to limitations in salvage techniques, an unquantifiable loss of scientific-educational information would result.	Approximately 4 miles of geologic formations with potential for medium paleontological significance, and 21 with low would be crossed. Due to limitations in salvage techniques, an unquantifiable loss of scientific-educational information would result.

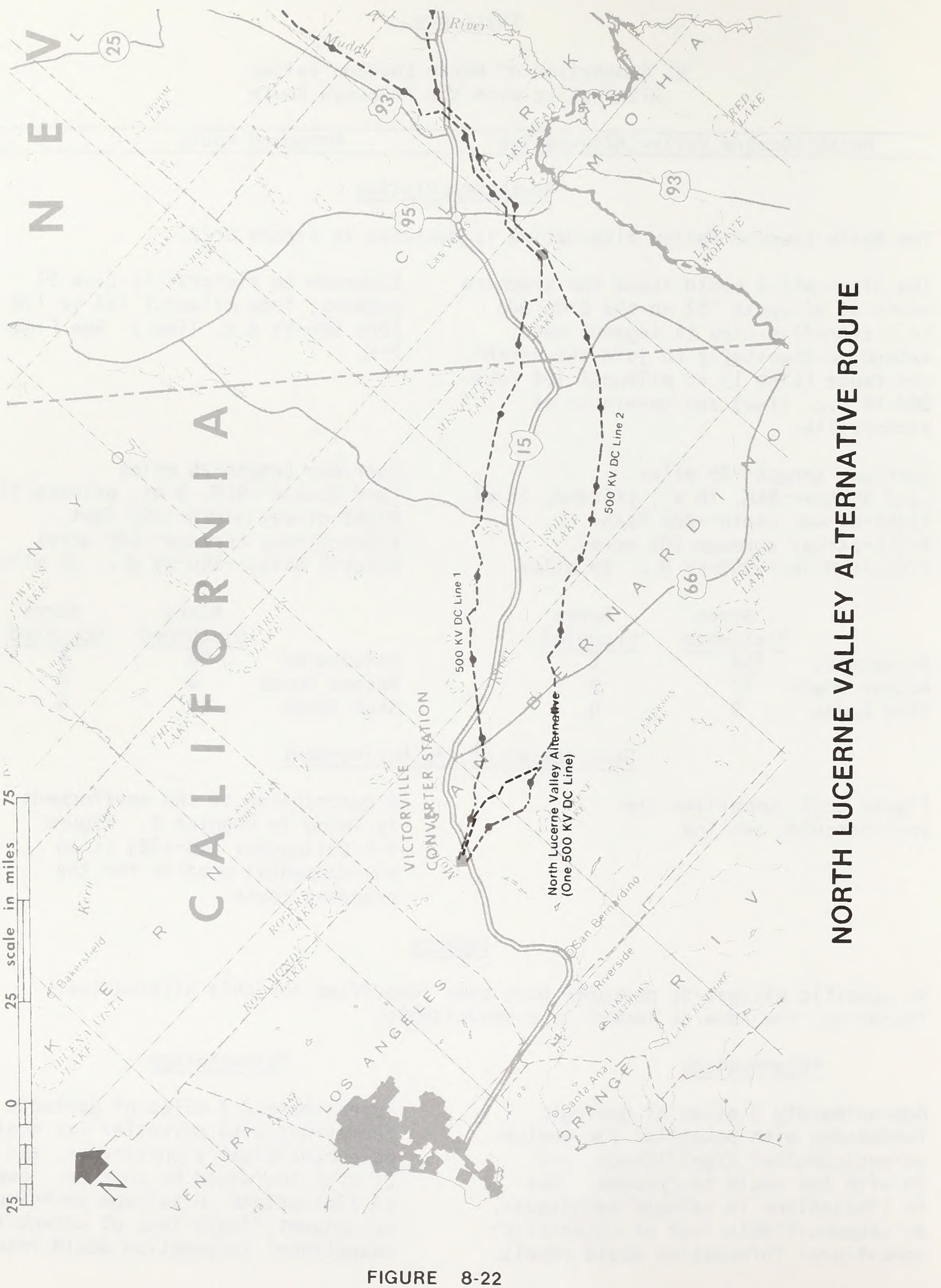

NORTH LUCERNE VALLEY ALTERNATIVE ROUTE
500 KV DC Line 1
500 KV DC Line 2
North Lucerne Valley Alternative
(One 500 KV DC Line)
VICTORVILLE
CONVERTER STATION
scale in miles
25
0
25
75
N
CALIFORNIA
NEV
Las Vegas
San Bernardino
Riverside
Santa Ana
Bakersfield
LOS ANGELES
VENTURA
ORANGE
KERN
SAN BERNARDINO
RIVERSIDE
CLARK
MOHAVE
LAKE MEAD
LAKE MOHAVE
SODA LAKE
BRISTOL LAKE
RED LAKE
CHINA LAKE
OWENS LAKE
ROGERS LAKE
ROSAMOND LAKE
River
Muddy
15
93
95
25
66

FIGURE 8-22

ENVIRONMENTAL PROFILE: NORTH LUCERNE VALLEY ALTERNATIVE

LEGEND

VEGETATION
- F- Forest
- MB- Mountain Brush
- PJ- Pinyon Juniper
- CD- Cold Desert Shrub
- HD-J Joshua Tree Forest
- C- Chaparral
- B- Barren
- R- Riparian
- UA- Urban Agriculture
- HD- Hot Desert Shrub

SOIL TYPE
- 1- Deep Alluvial Valley
- 2- Shallow, Shale-Clay
- 3- Shallow, Rocky
- 4- Desert
- 5- Mountain and Foothills

EROSION HAZARD
- 1- Slight-Moderate
- 2- Moderate-High
- 3- Severe

VISUAL FEATURES

SCENIC QUALITY
- A- High
- B- Medium
- C- Low

VISUAL ZONES
- F/M- Foreground/Middleground
- B- Background
- SS- Seldom Seen

SENSITIVITY
- H- High
- M- Medium
- L- Low

EXISTING MANMADE CONTRAST
- H- High
- M- Medium
- L- Low

LAND USE
- R- Open Range
- F- Forest
- U- Urban
- A- Agriculture
- B- Barren

PLANNING UNIT BY NAME

AREAS OF SPECIAL CONCERN (AOSC)
- U-LD-Urban Low Density
- Ag- Agriculture
- R-II- U.S. Forest Service Rare II Wilderness Recommendation
- WSA-BLM Wilderness Study Area
- RA- BLM Uninventoried Roadless Area
- Others- By Name

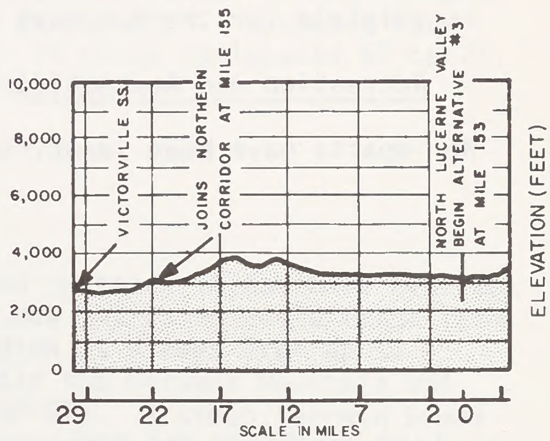
POLITICAL SUBDIVISIONS BY NAME

HABITAT OF SPECIAL ANIMAL LIFE
- UPD- Utah Prairie Dog
- DT- Desert Tortoise Concentration
- F- Threatened or Endangered Fish
- G- Gila Monster
- R- Raptor Concentration Area
- BF- Potential Black-footed Ferret
- BT- Bendire's Thrasher and Gilded Flicker
- WH- Wild Horses
- WB- Wild Burros
- U- Species
- WF- Water Fowl

IMPORTANT GAME HABITAT
- D- Critical Deer Range
- B- Desert Bighorn Sheep Range
- PB- Potential Desert Bighorn Sheep Range
- S- Sage Grouse Concentration Area
- P- Pheasant Habatat

CULTURAL RESOURCES: NUMBER OF SITES
- ( ) Eligible for National Register

PALEONTOLOGICAL RESOURCES
- H- Potentially High Paleontological Significance
- M- Potentially Medium Paleontological Significance
- L- Low Paleontological Significance



VEGETATION	HD			
SOILTYPES	4			
EROSION HAZARD	1	2		
SCENIC QUALITY	C	B	C	
VISUAL ZONE	F/M	SS		
SENSITIVITY	L			
EXISTING CONTRAST	L			
LAND USE	R			
PLANNING UNIT	STODDARD			
A. O. S. C.	NONE			
POLITICAL SUB	SAN BERNADINO (CALIF)			
SPECIAL ANIMALS	NONE			
GAME ANIMALS	NONE			
CULTURAL RESOURCES	2 (1)	0	2	
PALEONTOLOGY	M	L	M	L

FIGURE 8-23

TABLE 8-8 (concluded)

North Lucerne Valley Alternative	Proposed Route
Vegetation	Vegetation
No candidate, proposed, or listed threatened or endangered plant species occur on or near this alternative route.	No candidate, proposed, or listed threatened or endangered plant species occur on or near this portion of the proposed route.
Cultural Resources	Cultural Resources
This alternative route could impact four known archaeological sites, one of which is eligible for the National Register.	Three known archaeological sites, one of National Register quality, are located along the proposed route.
Recreation and Aesthetics	Recreation and Aesthetics
No impacts have been identified.	The line would be visible (medium contrast) from housing developments in the Apple Valley Area. The proposed route would cross through Sidewinder Valley, a recreation use area, Visual contrast would be high and would reduce recreational values to some visitors.
Land Use Plans and Controls	Land Use Plans and Controls
No conflicts have been identified.	The proposed line would violate BLM planning goals by creating a new corridor in Sidewinder Valley which is considered scenic and receives considerable recreational use (mileposts 161-179 of Figure 2-K).

TABLE 8-9

i. Delamar Mountain Wilderness Study Area
Alternative: Option 1

Alternate	Proposed Route
Route Description	
This option would relocate a portion of the Lincoln to Gypsum Junction segment of the Southern California Transmission System to avoid the proposed BLM Delamar Mountain Wilderness Study Area.	
This option would be to relocate milepost 56 to 71 of the proposed route from the east side of U.S. Highway 93 to the west side. The alternate line would be to the west of and parallel to an existing Nevada Power 69-kV a.c. transmission line.	The proposed Lincoln to Gypsum Junction segment would cross 200 feet within proposed WSA NV-050-IPP-07 (Delamar Mountains) for 14 miles (mileposts 57 to 71, Figure 2-D).
Aesthetics	
Anticipated increase in man-made contrast from the alternate line would range from low to medium when viewed within the U.S. Fish and Wildlife Service's Desert Game Range Wilderness proposal. The line would be visible (low contrast) from the Delamar Mountain WSA (NV-050-IPP-07).	Anticipated increase in man-made contrast from this new intrusion would range from low to medium as viewed from up to 4 miles within the Delamar Mountain WSA (NV-050-IPP-07). A steep terrain break would isolate the new line from the bulk of the WSA. The line would be visible (low contrast) from the Desert Game Range Wilderness proposal.
The alternative would require two additional crossings of U.S. Highway 93, in low quality scenery areas, visible to travelers in 700 vehicles daily.	The proposed transmission line, in combination with the existing 69-kV a.c. line that parallels U.S. 93 on the west would cause an an adverse "tunneling effect" to travelers in 700 vehicles daily between mileposts 56 to 71.
Construction on the west side of the highway would avoid the severe "tunneling effect" of U.S. 93 between mileposts 56 to 71 of the Lincoln to Gypsum Junction segment.	
Land Use	
The alternate route would be within an uninventoried BLM roadless unit that is contiguous to the Fish and Wildlife Service's Desert Game Range wilderness proposal. The uninventoried roadless unit will be recommended for "intensive wilderness inventory" in BLM's current statewide wilderness review.	Wilderness character (i.e. naturalness) and wilderness suitability would be impaired adjacent to the line, and could not be allowed prior to Congressional decision.

TABLE 8-9 (concluded)

Alternate	Proposed Route
The "intensive inventory" portion of BLM's wilderness review is not scheduled for completion until September 30, 1980. Location of the line within the unit would impair any wilderness character of suitability that the uninventoried unit may have adjacent to the line, and could not be allowed prior to completion of the wilderness review.	

TABLE 8-10

i. Delamar Mountain Wilderness Study Area
Alternative: Option 2

Alternate	Proposed Route
Route Description	
Under this option, milepost 56 to 117 of the proposed route on the east side of U.S. Highway 93 would be replaced by locating the 500-kV d.c. line in the existing Nevada 93. Under this option, the 69-kV poles would be removed and the 69-kV a.c. line would be placed on the new 500-kV d.c. line towers.	The proposed Lincoln to Gypsum Junction segment would cross 200 feet within proposed Delamar Mountain WSA (NV-050-IPP-07), for 14 miles (milepost 57 to 71).
Aesthetics	
Anticipated increase in man-made contrast from the alternate line would range from low to medium when viewed from within the Desert Game Range Wilderness proposal. The line would be visible (low contrast) from the WSA Delamar Mountain WSA (NV-050-IPP-07). The alternative would require two additional crossings of U.S. 93 in low quality scenery areas, visible to travelers in 700 vehicles daily.	Anticipated increase in man-made contrast from this new intrusion would range from low to medium viewed from up to 4 miles within the Delamar Mountain WSA (NV-050-IPP-07). A steep terrain break would isolate this new line from the bulk of the WSA. The line would be visible (low contrast) from the Desert Game Range Wilderness proposal.
Construction on the west side of U.S. 93 would avoid the severe tunneling effect of U.S. 93 between milepost 56 to 115.	The proposed transmission line, in combination with the existing line that parallels U.S. 93 on the west, would cause an adverse tunneling effect to travelers in 700 vehicles daily.
The alternate route would be within an uninventoried BLM roadless unit that is contiguous to the Fish and Wildlife Service's Desert Game Range Wilderness proposal. The uninventoried roadless unit will be recommended for "intensive wilderness inventory" in BLM's current statewide wilderness review.	
Land Use	
Even though the line would be within an existing right-of-way, it could impair the wilderness character, or wilderness suitability of the Desert Game Range Wilderness Proposal.	Wilderness character (i.e. naturalness) and wilderness suitability would be impaired adjacent to the line, and could not be allowed prior to Congressional decision.

TABLE 8-11

Muddy Mountain Wilderness Study
Area Alternative

Alternate	Proposed Route
Route Description	
This alternative would replace a portion of the Cedar Wash to Gypsum Junction segment of the Southern California Transmission System to avoid the Muddy Mountain Wilderness Study Area.	
This alternate route would be to shift the proposed line from the east to the west side of the existing transmission line at milepost 74 of the Cedar Wash to Gypsum Junction segment then shift back to the east side at Gypsum Junction.	The proposed Cedar Wash to Gypsum Junction segment would cross 200 feet within the BLM proposed Muddy Mountain WSA (NV-050-IPP-15), for 4 miles (mileposts 85 to 89). (See Figure 2-H.)
Aesthetics	
The proposed line would be visible (low contrast) from the north and west portions of the Muddy Mountain WSA.	The proposed line would be visible (low contrast) from the north and west portions of the Muddy Mountain WSA.
Land Use	
The alternative route would be relocated within an uninventoried BLM roadless unit along the Dry Lake Range. This unit is being recommended by the BLM as obviously and clearly lacking wilderness character in the statewide wilderness review, and should be dropped from further wilderness consideration by September 30, 1980.	Wilderness character (i.e. naturalness) and wilderness suitability would be impaired adjacent to the line, and could not be allowed prior to Congressional decision.

2. Higher Voltage Levels System

a. Description of the Alternative

This alternative to the Southern California System would consist of placing the voltage carried on the two 500-kV d.c. lines into one single circuit 765-kV d.c. line from the plant site to Victorville, California. This higher voltage line could be placed in the corridors described for the 500-kV d.c. lines in Chapter 1 or alternatives described in the routing section of this chapter.

The use of this alternative would compromise system reliability by running all of the power through one line. This alternative would place all of the Los Angeles Department of Water and Power's transmission lines coming from the east in one corridor.

b. Description of the Environment

The description of the environment for this alternative would be the same as that described for the proposed 500-kV d.c. system routes in Chapter 2 or the alternative routes described in this chapter.

c. Impacts

This alternative system would have the same impacts as described for the proposed routes discussed in Chapter 3 and the alternative routes described in this chapter, with the exception that only one line would be needed. The environmental advantage of using one line would be that less area would be affected, thereby reducing the associated impacts on wildlife, cultural resources, aesthetics, and reducing visual impact caused by multi-line highway crossings.

d. Mitigating Measures

The same mitigating measure discussed and evaluated for the proposed system in Chapter 4 and the routing section of this chapter would apply to this alterntive.

e. Adverse Impacts Which Cannot Be Avoided

Adverse impacts would be the same as those described for the selected segments in Chapter 5 and the routing section of this chapter.

3. Double Circuit System

a. Description of the Alternative

This alternative to the Southern California System would consist of placing both 500-kV d.c. circuits on a single tower from the plant site to Victorville, California. The double circuit system could be placed in any combination of corridors described in Chapter 1 or the routing section of this chapter.

There is some question as to the reliability of double circuiting. However, the system would be more reliable than the higher voltage system discussed in 2 above.

This alternative would place all of Los Angeles Department of Water and Power's transmission lines, coming from the east, in one corridor.

b. Description of the Environment

The description of the environment for this alternative would be the same as that described for the proposed 500-kV d.c. system routes in Chapter 2 and the routing section of this chapter.

The environment along this alternative would be the same as discussed in Chapter 2 for the proposed segments or the alternative routes described in this chapter.

c. Impacts

This alternative system would have the same impacts as described for the proposed routes discussed in Chapter 3 and the alternative routes described in this chapter, with the exception that only one line would be needed. The environmental advantage of using one line would be that less area would be affected, thereby reducing the associated impacts on wildlife, cultural resources, aesthetics, and reducing visual impact caused by multi-line highway crossings.

d. Mitigating Measures

Mitigating measures for this alternative would be the same as those discussed for the proposed transmission system in Chapter 4 and the routing section of this chapter.

e. Adverse Impacts Which Cannot Be Avoided

This alternative would have the same adverse impacts associated with the selected segments as discussed in Chapters 5 and the routing section of this chapter.

4. Underground Transmission

At present, it is assumed to be technically possible to install underground transmission at 500-kV a.c. However, to date there are no 500-kV a.c. pipe-type cable systems installed in the United States due to the combination of technical difficulty and high costs.

The major problems associated with underground high-voltage transmission are:

1. Dissipating the heat generated in the conductors. Unlike the overhead lines, where there is little restriction to the dissipation of heat from the conductors, the heat generated by losses in the underground system must be carried off through the voltage insulation system to the surrounding earth. The result is that, generally, two underground circuits are required to transmit the power that could be handled by one overhead transmission line.

2. Due to capacitive reactance of the underground system, electrical compensation equipment would be required on the surface every 25 miles.

3. It is estimated that oil pressurizing and pumping-plant facilities would be required about every 15 to 20 miles along the transmission line route over level terrain. In hilly or mountainous terrain, additional facilities would be required to keep large oil pressure differences from damaging the cables.

4. During construction, the environmental impact of an underground system would be similar to that of a pipeline that requires a continuous line of trenching and backfilling. This could result in a considerably greater environmental impact than an overhead system. After construction, access to the cable system would be required for regular maintenance and repair work.

5. Estimated costs for placing the proposed IPP power-transmission system underground would be approximately 17 times the cost of the proposed overhead system.

J. ALTERNATIVE MICROWAVE COMMUNICATION SITE

An alternative to the proposed Moroni Microwave site is the Wood Bench site. It would be located on Wood Bench within IPP's proposed right-of-way for the plant site. Microwave equipment would be housed in an 8 foot by 22 foot prefabricated building. The antennas would be supported on an adjacent tower approximately 70 feet high. Electrical power would be supplied by solar panels and storage batteries. All men, equipment, and supplies would be transported by helicopters. The site would occupy less than 1 acre and be at an elevation of about 5,600 feet.

The site would be located on shallow rocky soils in an area surrounded by cold desert vegetation. *Sclerocactus wrightiae*, a cactus proposed for endangered status is known to occur in this area. The scenic quality of the area is medium and it is seldom seen. The visual sensitivity of the site is low.

The area has a very low wildlife population and no known archaeological sites.

Table 8-12 compares this alternative to the proposed Moroni Slope site.

K. ALTERNATIVES TO THE PROPOSED LAND SALE FOR THE GENERATING STATION

Because the Lynndyl Alternative site is located near the outer perimeter of public lands in the Delta-Lynndyl area, the Bureau of Land Management does not anticipate management or use problems on the adjacent public lands.

Surface resource values are low in terms of domestic livestock forage; wildlife habitat; recreational and other current uses of natural resources are not extensive.

One option would be for the Department of the Interior to grant a right-of-way for the 4,640 acre power plant site (under Title V of FLPMA) rather than the proposed land sale (Under Title II).

Environmental impacts would essentially remain the same under either land sale or the granting of right-of-way. According to a representative of IPP, participants, except Utah municipalities, would pay in lieu of *ad valorem* taxes based on the value of project improvements. These payments to local government would be based on 89 percent of the value of project improvements because 11 percent of the electrical power generated would be delivered to Utah participating municipalities.

TABLE 8-12

Comparison of Wood Bench and Moroni Slope Microwave Communication Sites

Alternative Wood Bench Site	Proposed Moroni Slope Site
Impacts	
About 1 acre of cold desert vegetation would be removed and occupied.	About 25 acres (including access roads) of cold desert vegetation would be removed and occupied.
The site is open to complete multiple use management.	Primitive values in a portion of the proposed Hondu Primitive area would be lost.
The habitat of the proposed endangered plant _Sclerocactus_ _wrightiae_ could be reduced.	No threatened or endangered species are known to occur on this site.
Mitigating Measures	
B-3.	
Adverse Impacts Which Cannot Be Avoided	
A few individuals of a proposed endangered plant species, _Sclerocactus_ _wrightiae_ might be lost.	Primitive values in a portion of the proposed Hondu Primitive Area would be lost.

The major part of the revenue expected to be paid to local government would be on project improvements (power generating station and support facilities).

Estimates indicate that federal payments "in lieu" of taxes to local government on the 4,640 acre plant site would be slightly lower than taxes expected if the site were sold to IPP participants.

If a rightof-way were granted for the power plant site, the federal government would retain title to the land and long-term control for other uses should the project be abandoned or removed. This alternative would have a federal procedure and policy advantage (i.e., established regulations) over the proposed land sale, however, it would not result in greater resource or management benifits.

A second option is for the federal government to exchange (under Title II of FLPMA) the 4,640 acre generating station for "equal value" land owned by the State of Utah. The State of Utah would then sell these acquired lands to the proponents of IPP for the construction and operation of power generating station. The primary advantage of this second option or alternative would be of a timing and procedural nature, since regulations and techniques for federal-state land exchange are well established while those for direct federal land sales are evolving.

The Intermountain Power Association currently has authority to issue tax free revenue bonds under the Utah Interlocal Cooperative Act, as amended, to finance the project.

The applicants assessment of the advantages or disadvantages of ownership versus a federal grant of rightof-way for the power plant site is:

> "IPP will be financed by the issuance of power supply revenue bonds. It is imparative that the project have a clear right to the use of those lands upon which the capital improvements will be made for the duration of the bond terms. There would be serious adverse impacts to the financing of the project if rights-of-way were issued for terms shorter than the conventional 35-year bond issue normally used for this type of project. Additionally, the uncertainties related to future regulatory procedures which could be imposed at any time during the term of a grant of right-of-way could cause land management difficulties for both BLM and the project. Limitations on right-of-way duration terms impose a constraint on the project, which, when contrasted with the normal utility assumption of a 35 to 40 year life for the generating station, and the rights, in perpituity, associated with the cooling water supply for the Project, may be entirely unrealistic." (IPP, 1979).

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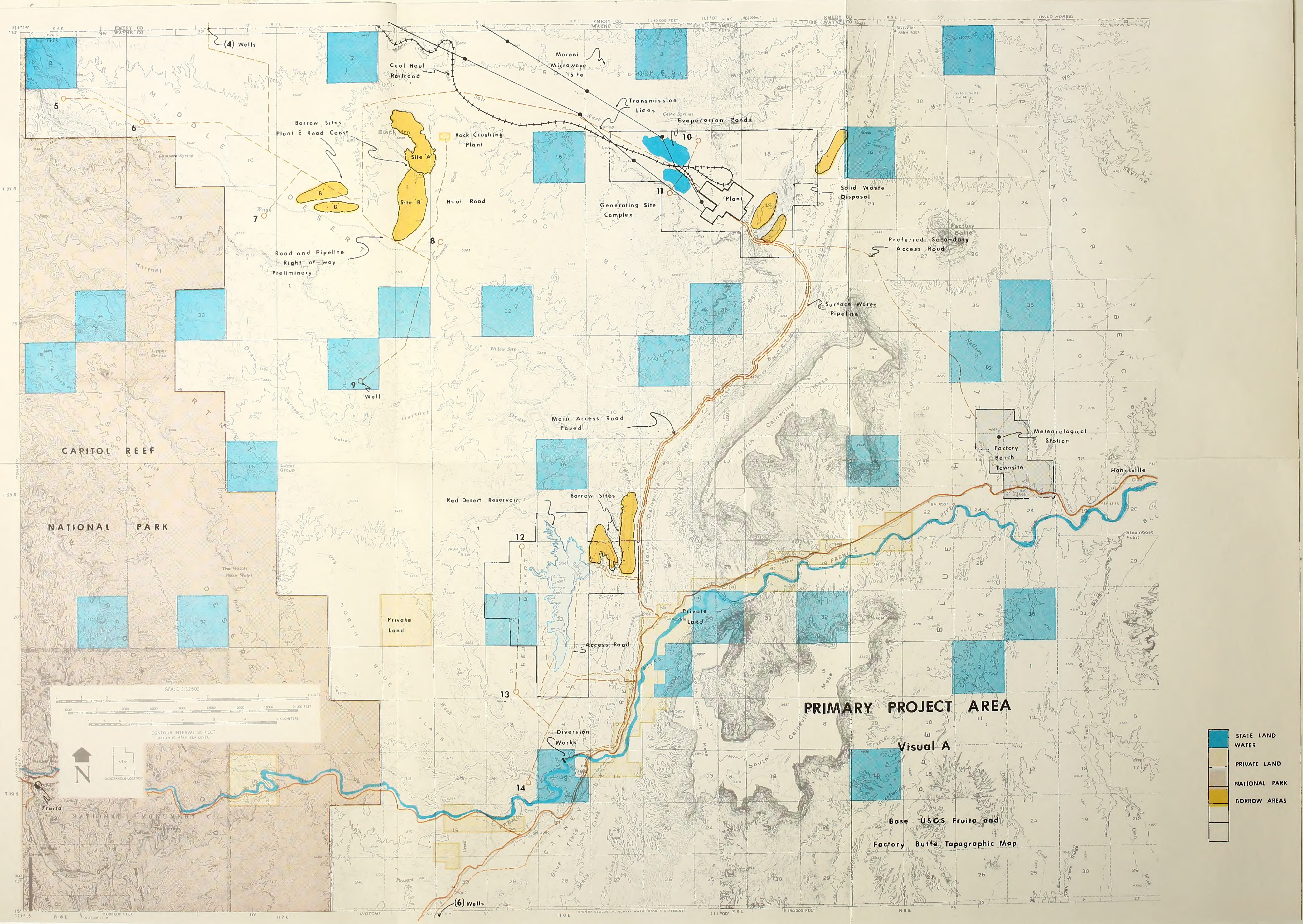

PRIMARY PROJECT AREA
Visual A
STATE LAND
WATER
PRIVATE LAND
NATIONAL PARK
BORROW AREAS
Base: USGS Fruita and Factory Butte Topographic Map
CAPITOL REEF
NATIONAL PARK
(4) Wells
Coal Haul Railroad
Moroni Microwave Site
Transmission Lines
Evaporation Ponds
Borrow Sites Plant & Road Const
Rock Crushing Plant
Site A
Site B
Haul Road
Generating Site Complex
Plant
Solid Waste Disposal
Preferred Secondary Access Road
Road and Pipeline Right of way Preliminary
Surface Water Pipeline
Well
Main Access Road Paved
Meteorological Station
Factory Bench Townsite
Hanksville
Red Desert Reservoir
Borrow Sites
Private Land
Access Road
Diversion Works
(6) Wells
Fruita
SCALE 1:62500
CONTOUR INTERVAL 80 FEET
DATUM IS MEAN SEA LEVEL
N